WESTERN GAS

July
1928

20 Cents
the Copy

In this artist's sketch is suggested the attractive exterior of the Oklahoma Natural Gas Corporation's general headquarters, now nearly complete at Tulsa.

LIBRARY OF

A MONTHLY JOURNAL DEVOTED TO THE WESTERN GAS & APPLIANCE INDUSTRIES

Won't leak

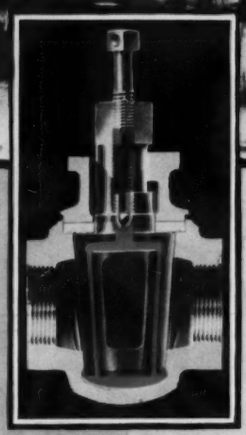
TRADE MARK

Won't stick

MERCO

—for gas service!

GOVERNOR BY-PASS INSTALLATION OF NORDSTROM VALVES



The genuine lubricated plug valves

Merco Nordstrom Valve Company

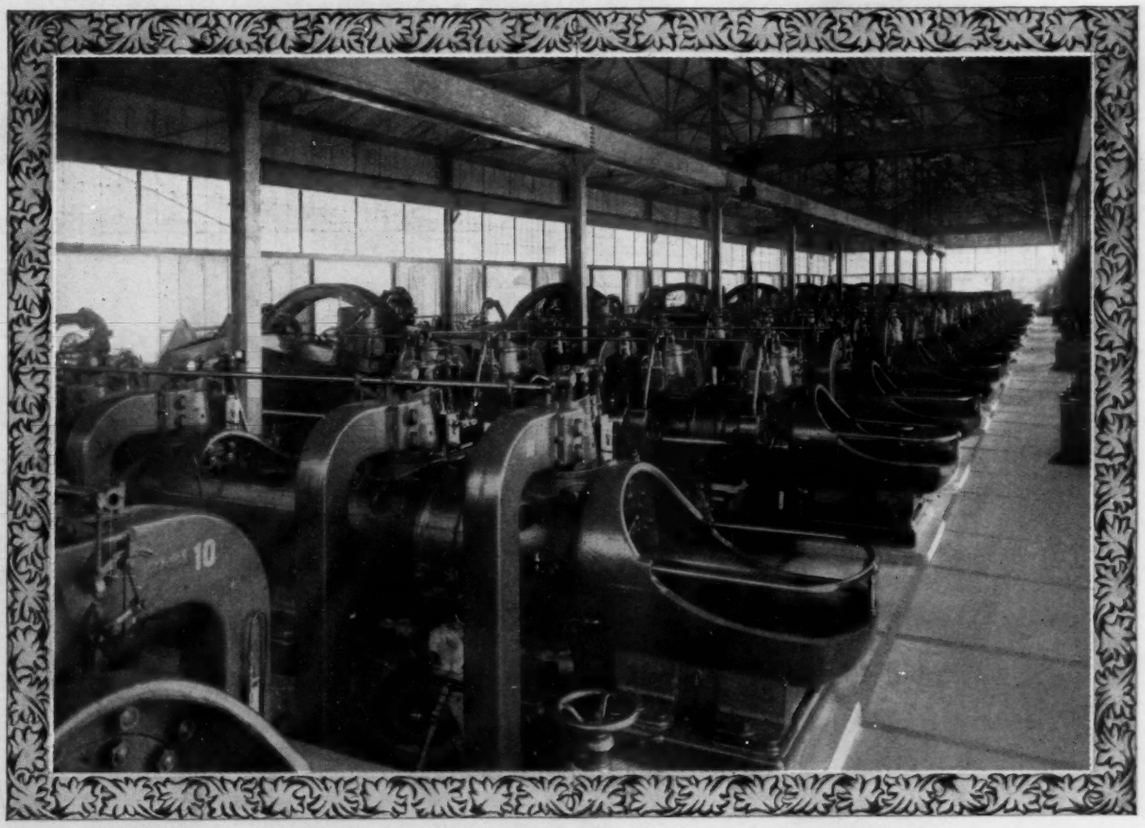
Subsidiary of The Merrill Co.

Engineers—Manufacturers

San Francisco: 121 Second St.
Los Angeles: Union Bank Bldg.
Cleveland: Engineers Bldg.
Dallas: Magnolia Bldg.
Houston: Petroleum Bldg.
Chicago: Peoples Gas Bldg.
Boston: 184 Boylston St.
New York City: 11 W. 42d St.
New Orleans: Masonic Temple Bldg.
Factories: Oakland, Calif., and Belleville, N. J.
Agencies in principal cities.

Nordstrom Valves

THREE New Cooper Type-19's Near Sarepta, Louisiana



Ventura Fuel Company's Gas Compressing Plant Near Ventura, California, Contains Ten Cooper Type-19 Twin-Tandem, 760 B. H. P. Gas Engines Direct Driving Cooper Two-Stage Compressors

Magnolia Gas Company is completing a compressor station near Sarepta, Louisiana, with three of the new Cooper Type-19 twin-tandem gas engines, each rated at 760 brake horse power.

This Cooper Type-19 engine has been developed especially for medium size gas compressing stations, large gasoline plants and gas-electric power installations. The design is the same as the Cooper larger gas engines and it therefore has the same reliability and economy. The parts are light enough to be easily hauled and erected, yet the unit is large enough to show a low construction and operating cost when compared on the horse power basis.

It is built as a single cylinder 200 horse power; twin cylinder 400 horse power; single tandem 380 horse power and twin tandem 760 horse power.

THE C. & G. COOPER COMPANY

Los Angeles, Calif.
649 S. Olive Street

Dallas, Texas
1111 Magnolia Bldg.

Tulsa, Okla.
615 Kennedy Bldg.

July, 1928, Volume IV, Number 7. WESTERN GAS is published by Western Business Papers, Inc., at 124 West Fourth Street, Los Angeles, California. Subscription price (in advance) 20 cents the copy; $2.00 per year; 3 years $5.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, California, under the Act of March 3, 1879.

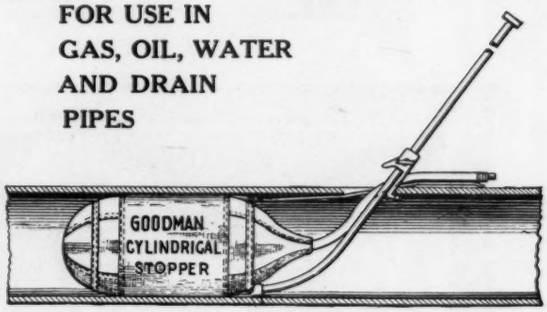
Street Department Supplies

Gas Main Bags

THREE TYPES

TYPE A—Seamless.
TYPE B—Reinforced Seams
TYPE C—Canvas Covered

FOR USE IN
GAS, OIL, WATER
AND DRAIN
PIPES



Air Line Mask

With or without Blower.

Mask and Blower in separate cases.

Blower will supply sufficient air for 4 masks.

If you have not received your copy of our new catalogue, please let us know.

Safety Gas Main Soap Tape

For bandaging broken pipe. Also binding tape to cover soap tape bandage.

Sample on request.

Safety Gas Main Stopper Co.

523 Atlantic Avenue, BROOKLYN, N. Y.

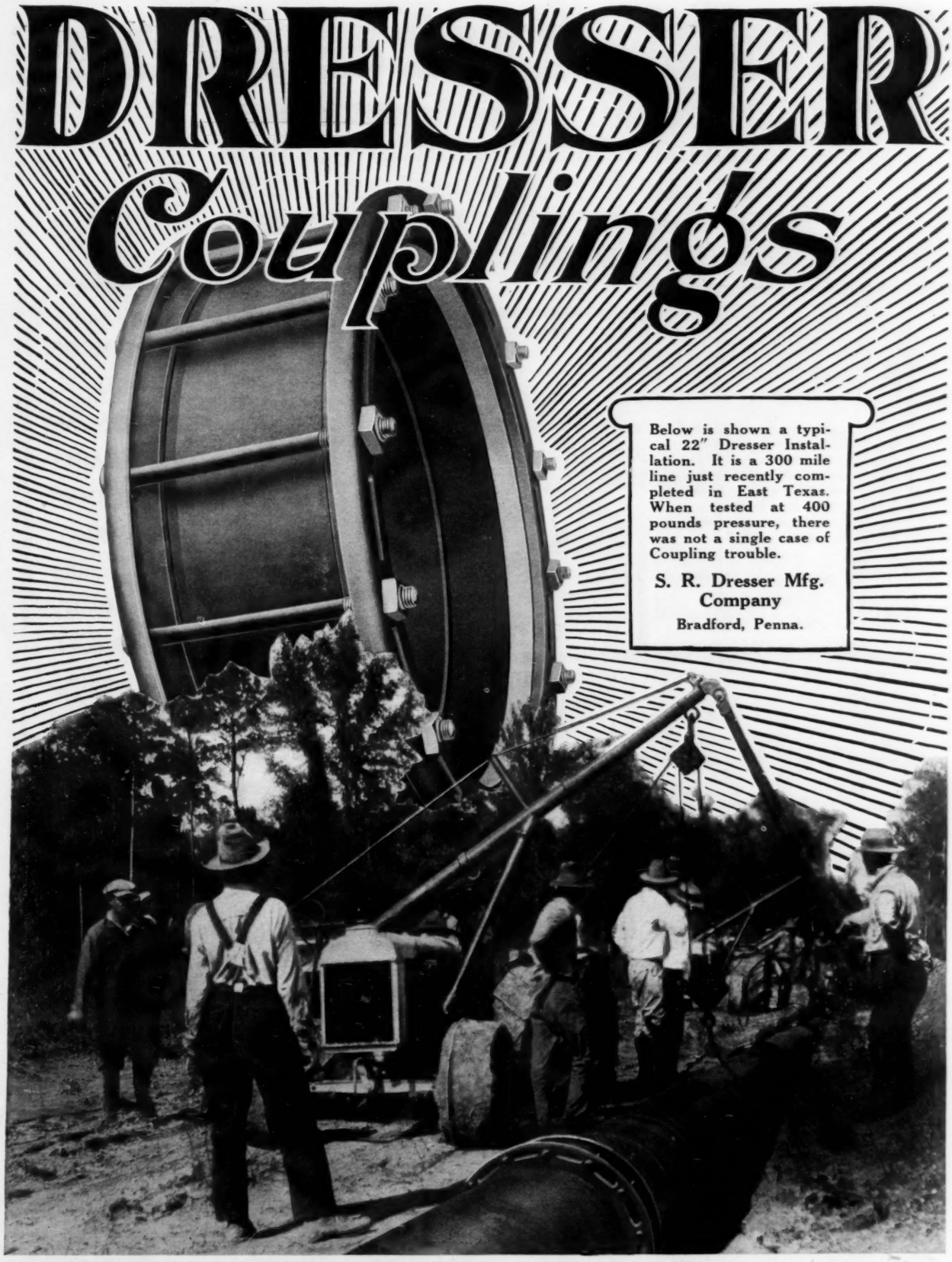
New England Representative
The Eastern Service Co., Boston, Mass.

Texas-Louisiana Representative
Maintenance Engineering Corp.
Box 1402, Houston, Texas

Pacific Coast Representative
C. B. Babcock Co., San Francisco, Calif.

Mid-Western Representative Circle Corporation Tulsa, Oklahoma

DRESSER Couplings



Below is shown a typical 22" Dresser Installation. It is a 300 mile line just recently completed in East Texas. When tested at 400 pounds pressure, there was not a single case of Coupling trouble.

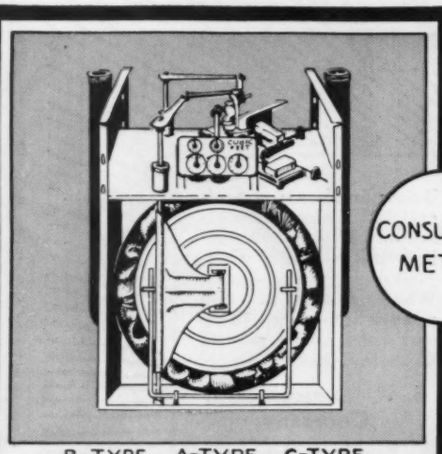
S. R. Dresser Mfg. Company

Bradford, Penna.

DOMINATE

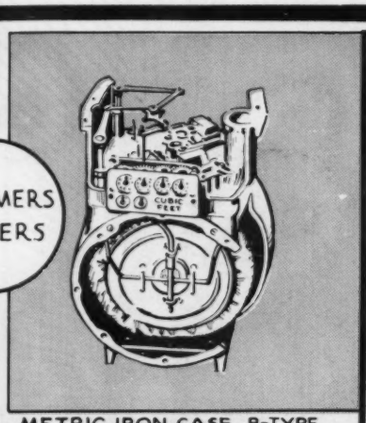
Known Factors

The Combined Skill, Experience, Resources and Facilities of Nine Factories Devoted Exclusively to the Manufacture of Gas Meters and Allied Apparatus

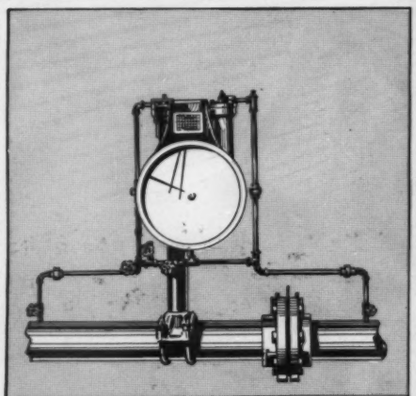


B-TYPE A-TYPE C-TYPE
ALL STANDARD CAPACITIES

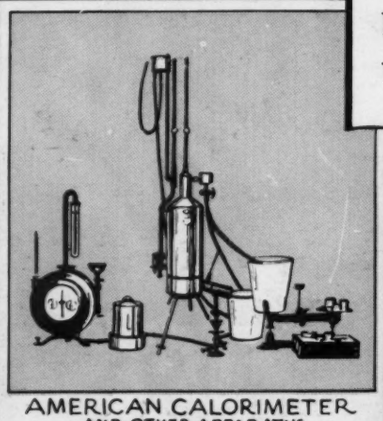
CONSUMERS METERS



METRIC IRON CASE B-TYPE
For Low, Medium or High Pressure



ORIFICE METERS



AMERICAN CALORIMETER
AND OTHER APPARATUS
RECOGNIZED AS STANDARD

AMERICAN METER CO. MEASUREMENT ENGINEERS CUBIC FEET

AMERICAN METER COMPANY
NEW YORK
AMERICAN METER COMPANY
CHICAGO
HELME & McILHENNY
JOHN J. GRIFFIN & COMPANY
MARYLAND METER WORKS
D. McDONALD & COMPANY
METRIC METAL WORKS
PACIFIC METER WORKS
NATHANIEL TUFTS
METER WORKS

The Products of American Meter Company Factories are Adapted to Requirements

A COMPLETE LINE OF QUALITY GAS METERS TO MEASURE GAS IN ANY QUANTITY EACH A KNOWN FACTOR IN METER VALUE

American Meters embody the many patented and exclusive characteristics that prolong life and accuracy over the years and that contribute to true economy in meter investment

in Meter Value

Background, Manufacturing Record and Organization in Their Relation to the Specialized Art of Gas Meter Manufacture

GENERAL PRODUCT LIST

Consumers' Gas Meters
Tinned Steel Case and Metric Iron Case
Models ~ in Standard Capacities
Types ~ to suit specific requirements embodying characteristics and patents exclusive with American Meters

Special Meters
Demonstration Meters
Demand Meters

Extra Large Capacity
Orifice Meters
Station Meters

Apparatus
~ for testing gases (American Calorimeter etc)
~ for testing meters (Meter Provers etc)
~ for service requirements (New American Service Pump etc)

Diaphragms
exclusive leather quality and impregnation formulas

Complete Meter Maintenance Requirements

Every Factory of American Meter Company can Supply Its Customers with Complete Gas Measurement Requirements

KNOWN FACTORS IN METER VALUE

CUBIC FEET

In the Light of ~

1 *Pioneering*
2 *Experience*
3 *Faithful Performance*
4 *Deep-Rooted Identification with the Gas Industry*
5 *Widespread Approval*
6 *Territorial Specialization*
7 *Facilities for Meter Maintenance*

These are but a few of the known factors that determine the value of American Gas Meters as a profitable investment

AMERICAN METER COMPANY

Incorporated

ESTABLISHED 1836

The World's Largest Manufacturers of Gas Meters and Allied Apparatus

NEW YORK 1836 • PHILADELPHIA 1848 • ALBANY 1855 • BOSTON 1860 • BALTIMORE 1866 • ERIE 1888
CHICAGO 1896 • SAN FRANCISCO AND LOS ANGELES 1901 • KANSAS CITY

Here are the requirements of a permanent pipe line corrosion preventive

BITURINE ENAMEL MEETS EVERY ONE

A pipe line coating to permanently solve the corrosion problem must have these qualifications:

1. It must be waterproof.
2. It must be unaffected by soil acids and alkalies.
3. It must have good adhesive qualities.
4. It must not disintegrate with age.
5. It must be incapable of absorption by the soil in contact with it.
6. It must not be affected by underground temperature changes.
7. It must be a dialectric, in order to offer protection against electrolysis.
8. It must be capable of practical and speedy application in the field.
9. It must be unaffected by ordinary handling in the field and not damaged by lowering pipe into the ditch.
10. It must be of substantial thickness.
11. It must be economical.

On this page are shown the 11 qualifications (decided upon by experts) essential in any pipe coating that will give permanent protection against corrosion. BITURINE ENAMEL fulfills every one of them.

For more than sixteen years many leading oil and gas industry executives have been successfully solving pipe line corrosion problems with Biturine Enamel—the permanent corrosion preventive. Hundreds of miles of pipe line have been coated with Biturine Enamel and operators have pronounced it entirely successful in giving permanent protection.

Unaffected by Acids, Alkalies or Electrolysis

Biturine Enamel is a heavy, quick-setting bituminous coating, tough but not brittle. It is applied hot and requires no wrapping. Adheres tightly to metal and will not crack. It is absolutely impervious to corrosive elements.

Biturine Enamel is manufactured by Hill, Hubbell & Company as one of a special line of paints for the oil industry.

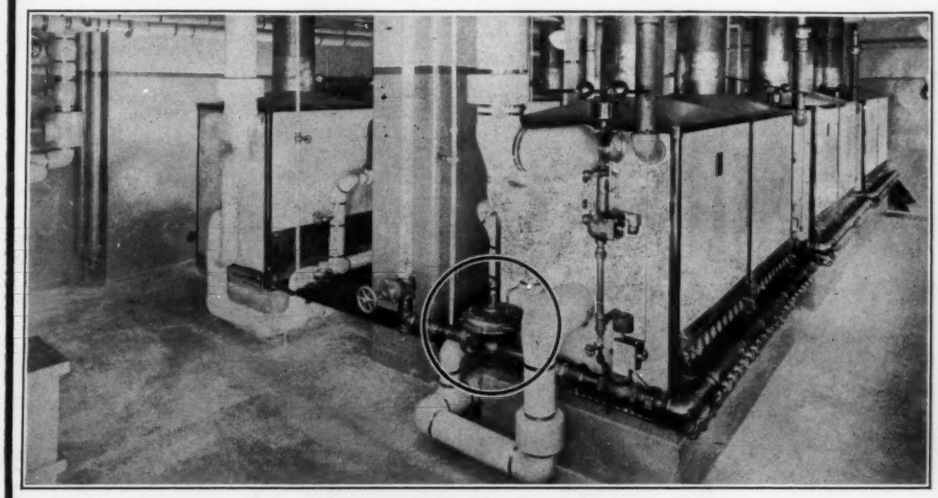
No skilled labor necessary to apply Biturine Enamel.

Valuable, practical data and specifications furnished upon request.

HILL, HUBBELL & COMPANY

Manufacturers of
Highest Grade Oil Industry Paints and Pipe Line Coatings
Factories at SAN FRANCISCO and TULSA
District Offices:

SAN FRANCISCO
SEATTLE
LOS ANGELES
TULSA
PORTLAND
HOUSTON
NEW YORK CITY
BALTIMORE

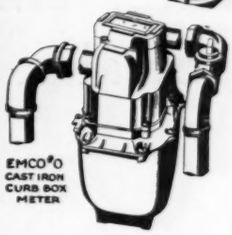


EMCO Regulators on The World's Largest Heating Installation

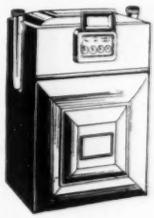
WHEN the largest gas heating plant in the world was installed recently in Boston, Mass., it was equipped with EMCO Water Heater and Gas Appliance Regulators. A large majority of the makers of nationally known heating systems use EMCO Regulators as standard equipment. Progressive manufacturers of gas appliances and equipment realize that the accuracy and reliability of EMCO Pressure Regulators will insure good performance on any type of gas equipment.

EMCO #0 CAST IRON DRY GAS METER

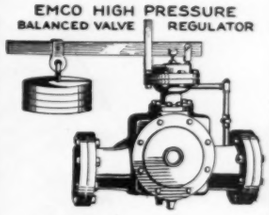
IRONCLAD CAST IRON DRY GAS METER



EMCO #0 CAST IRON CURB BOX METER



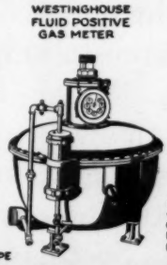
EMCO TIN METER



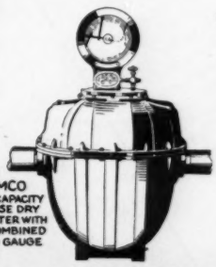
EMCO HIGH PRESSURE BALANCED VALVE REGULATOR

EMCO WATER HEATER AND GAS APPLIANCE REGULATOR

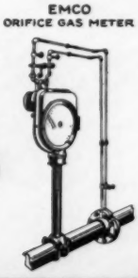
EMCO #5 PRESSED STEEL TYPE DRY GAS METER



WESTINGHOUSE FLUID POSITIVE GAS METER

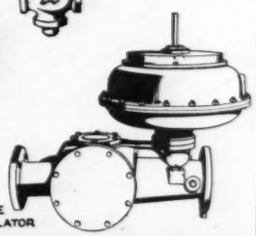


EMCO LARGE CAPACITY CAST CASE DRY GAS METER WITH EMCO COMBINED RECORD GAUGE



EMCO ORIFICE GAS METER

EMCO DOMESTIC SERVICE REGULATOR



EMCO LOW PRESSURE BALANCED VALVE REGULATOR

PITTSBURGH EQUITABLE METER COMPANY

MAIN OFFICE AND WORKS PITTSBURGH, PA.

NEW YORK CHICAGO COLUMBIA, S.C. LOS ANGELES DALLAS TULSA SEATTLE KANSAS CITY SALT LAKE CITY

One of the 8 Ads Being Used in the P. G. and E. Automatic Gas Water Heater Campaign

Automatic hot water service helps men to success

THE jobs that count are held by happy folks. For people like to do business with the cheerful optomist.

And here's a simple, easy method to get that way—Jump out of bed in the morning and get under a perfect hot and cold shower, stay under it until you feel refreshed. Then take plenty of hot water for shaving and you'll start the day cheerfully. If you come home tired or can't sleep, a tepid bath soothes and rests you.

Automatic Gas Water Heaters are best

The best way to have plentiful hot water is with an Automatic Gas Water Heater. It keeps abundant hot water ready for instant use.

Old-fashioned heaters are not efficient

Old-fashioned water heaters do not give convenient and efficient hot water service. You know how one must light the gas or the fire and wait and ponder while a few gallons of water are being warmed. And then, this water is all exhausted when one person takes a bath. If another member of the family or guest wants a bath too, he must go through the same trouble-some task of waiting.

Modern heaters are most popular

Compare that with a modern Automatic Water Heater. You never have to bother about it because there's always hot water instantly ready for use. There's plentiful hot water for the dishes, for bathing and for every other household need.

Most economical

An Automatic Gas Water Heater heats water for one-fifth of a cent per gallon, the lowest cost for heating water in the home. Why a bath only costs about 3c, the price of three sticks of chewing gum. We're offering the Ruud, Pittsburg, Humphrey and Hoffman Automatics.

We are interested in seeing that you get good service from the gas after it passes through the meter. That is why we recommend Automatics. That is why, after an Automatic is installed, a PG and E expert inspects the heater to see that it works properly.

SPECIAL OFFER

Do you know you can install an Automatic Gas Water Heater in your home for as low as $5 down and $5.95 a month? 'tis in 1" dish washer included with the Automatic you select during this sale. Phone or call at our office.

PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed by Californians·

227-228 Accl. 5726.

Reproduction of a 3 column 15 inch newspaper advertisement.

Eight big advertisements were written to help sell Automatic Gas Water Heaters and as usual, all the dealers in our territory sell as many water heaters during our campaign as we do. So this ad and the other seven will help everyone sell more quality Automatic Gas Water Heaters.

PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed
by Californians·

ROOTS

Announcing

The NEW ROOTS METER

The P. H. & F. M. ROOTS CO.

CHICAGO
Peoples Gas Building

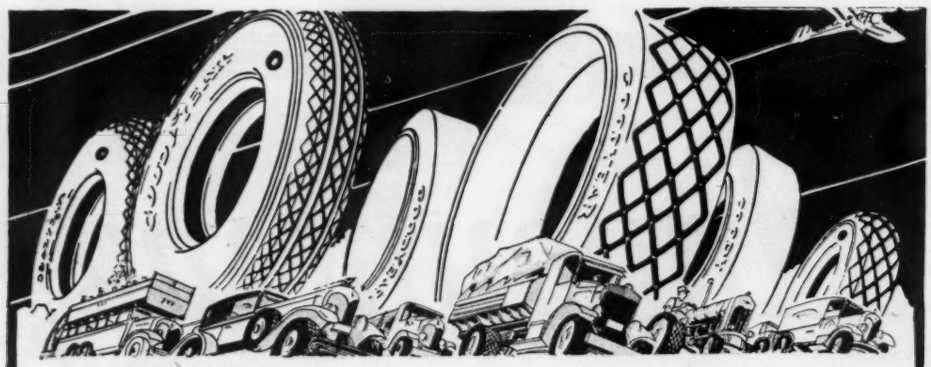
CONNERSVILLE, INDIANA

NEW YORK
120 Liberty Street

Originators of the Double Impeller Rotary Principle

WESTERN REPRESENTATIVE:
SUTOR & COMPANY, 680 South Central Avenue, Los Angeles, California

Complete Information on Request



From now on . . .

Motor Tires

Incorporated

HOWARD T. WAYNE, President — C. W. BRADBURY, Vice-Pres. — L. H. CLAWSON, Vice-Pres. — GEO. B. ZINS, Secy. — C. W. JAYRED, Treas.

Formerly

Truck Tire Service Co.
Los Angeles
Hollywood · Long Beach

Zins & Clawson Service Company
Los Angeles · Santa Monica

Continuing the same dependable and efficient Service and Maintenance on

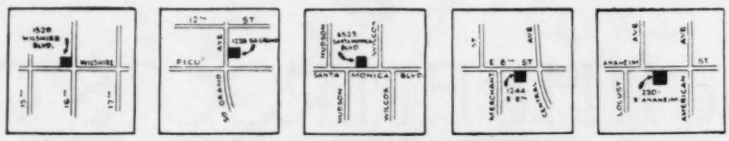
GOODYEAR TIRES

In keeping with the modern trend in practically every line of merchandising—that of pooling buying power, selling effort and service for the ultimate benefit of the consumer, the affiliation of these two prominent tire concerns has created what is now the largest Goodyear Sales and Service organizain the entire United States.

United—as MOTOR TIRES, INC. —it will be the aim of this new organization to maintain the same high standards of service in the sale and maintenance of Goodyear Passenger Car and Truck Tires for which each has been individually noted for years, thus assuring the purchaser a maximum of satisfaction from his tire investment.

MOTOR TIRES, Inc.

Locations



SANTA MONICA
1529 Wilshire Blvd.
28386

LOS ANGELES
1228 S. Grand
WE-3554 & 5710

HOLLYWOOD
6523 Santa Monica Blvd.
HO-5524

LOS ANGELES
1244 E. 8th St.
TR-6565

LONG BEACH
220 E. Anaheim
62279

NEW LOW PRICES NOW IN EFFECT ON GOODYEAR TIRES

"A Tire for Every Need"

Motor Tires, Inc.

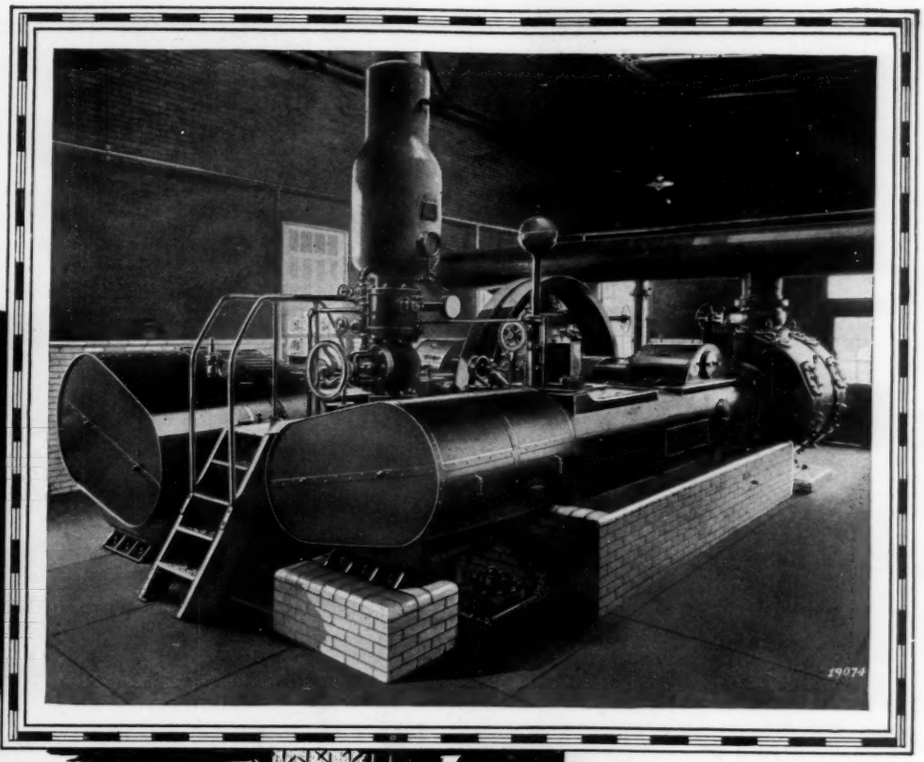
SANTA MONICA
1529 Wilshire Boulevard
28386

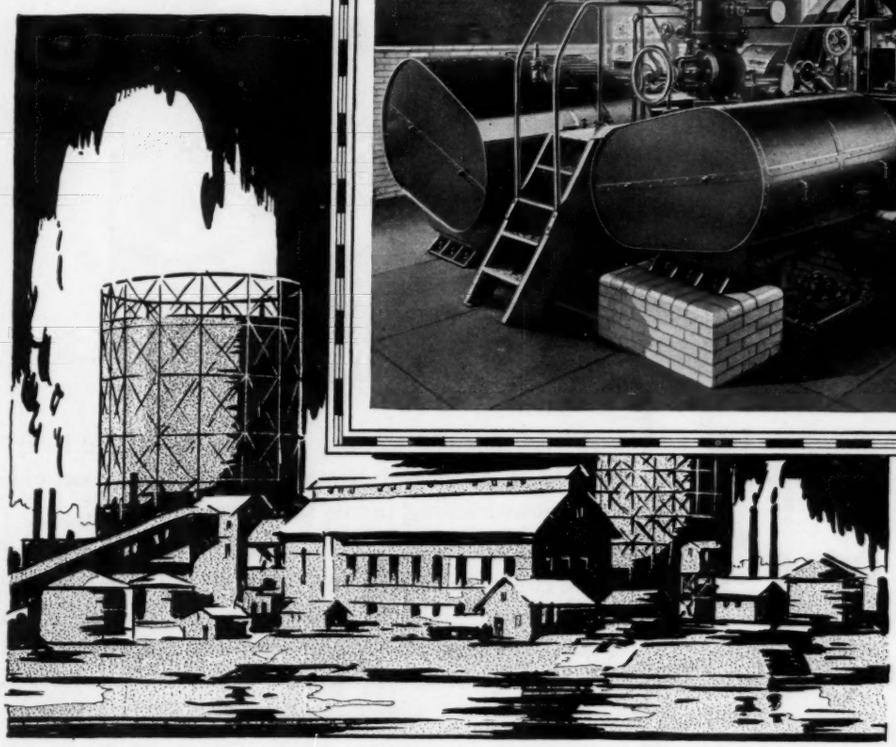
LOS ANGELES
1244 E. 8th St.
TR-6565

HOLLYWOOD
6523 Santa Monica Boulevard
HO-5524

LOS ANGELES
1228 S. Grand
WE 3554 and 5710

LONG BEACH—220 E. Anaheim—62279





Type XPV Gas Compressor with balanced piston steam valves and automatic power cut-off governor.

For All Pressures and All Capacities

The XPV is built in sizes with piston displacements ranging from 250 to 14,500 cubic feet per minute. Write for Bulletin 3044 which describes this type of unit. If you are interested in an electric-driven compressor, let us send you Bulletin 3150.

Ingersoll-Rand Gas Compressors will handle high or low pressures with the maximum economy. Where a steam-driven machine is desired, the XPV shown above will meet a wide range of conditions with satisfaction. The automatic cut-off governor and large valve areas insure pronounced savings. Any desired operating pressure can be automatically maintained by setting the regulating equipment.

The XPV has balanced piston steam valves and light compensating rings that sustain its high initial efficiency throughout the life of the machine. It will operate on super-heated and high-pressure steam or on saturated steam, and consumes only 65% to 75% as much steam as compressors having flat type steam valves and throttling governor.

INGERSOLL-RAND COMPANY—11 BROADWAY, NEW YORK CITY

1460 East Fourth Street
Los Angeles, Calif.

526 First Avenue, South
Seattle, Washington

Rialto Bldg.
San Francisco, Calif.

909-C

Ingersoll-Rand

A "fair" example of Hotzone's *new* appeal to beauty

Sell the Hotzone Water Heater as an aid to beauty! Talk of frequent shampoos and midnight massages and velvet smooth skins. Tell of hot water as an aid to faces. This is Hotzone's modern appeal; and *— it puts an entirely new complexion on water heater selling.*

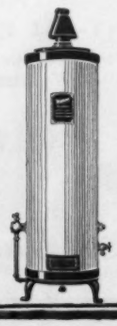
Why suggest sinks and scullery maids? Why stress the kitchen, the laundry or even the all-tiled bath? Old-fashioned coil heaters could serve those old-fashioned selling points plenty well enough.

Beauty demands instant hot water at any hour of the clock—a service which only a self-action heater can bring. And, the only Self-Action Heater which has been persistently stressing this important fact is the Welsbach Hotzone. Thus, those who sell Welsbach are a jump ahead at the very start.

The attractive display shown above is a fair example of how forcefully the "beauty appeal" can be illustrated. This window display definitely establishes the Hotzone Water Heater as a beauty aid as well as a household necessity.

We have, in addition, prepared a series of striking newspaper advertisements along this same line. They bring Beauty to your aid in selling Welsbach Hotzones. Let us send you complete information regarding this 1928 model advertising and merchandising service. Address Welsbach Co., San Francisco Office, 863-865 Mission Street.

Member American Gas Association
Member Pacific Gas Association

Welsbach  **HOTZONE**

SELF ACTION GAS WATER HEATER

WESTERN GAS

307 Thomas Building,
Dallas, Texas
Phone 2-8708

447 Sutter Street
San Francisco, Calif.
Phone GArfield 2772

Publication Office, 124 West Fourth Street
Los Angeles, Calif. Telephone TUcker 8982

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JAY JENKINS
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GEORGE H. FINLEY
Managing Editor

ELLIOTT TAYLOR
San Francisco Manager

CRAIG ESPY
Mid-Continent Manager

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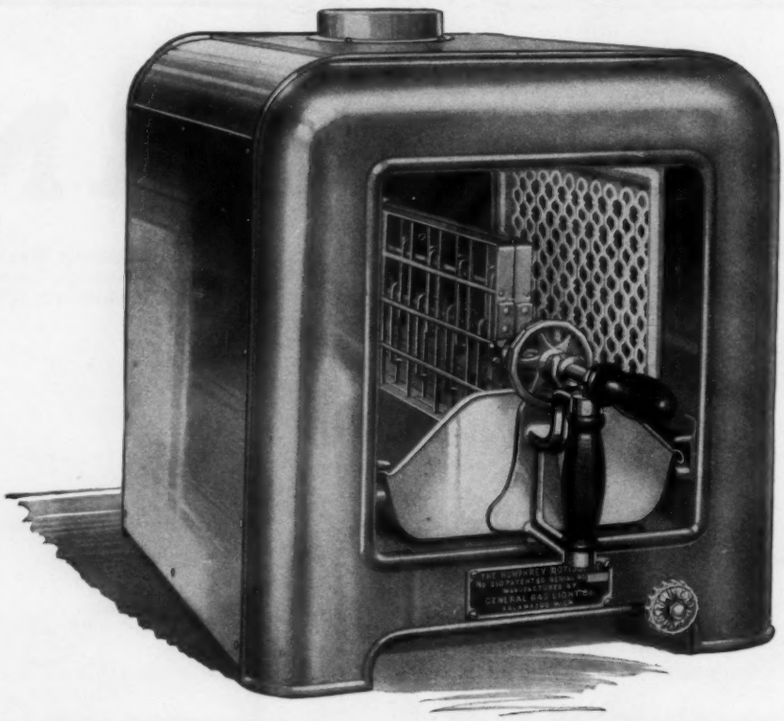

The Humphrey Rotisserie—An Especially Desirable Load

—Maintaining steady volume during summer months, when domestic load normally falls off;

—*Adding* to the load in all cases, since it does not supplant other equipment;

—Advertising the use of gas, since in most installations the Humphrey Rotisserie is placed directly before the public (as in restaurant windows, barbecue stands, club grills, etc.);

—Appealing to a wide market, which includes all restaurants, cafes, clubs, hotels, and even private homes;

—Priced to create demand;

—Backed by Humphrey quality and sold under the Humphrey name;

—A unique, highly efficient product, entirely non-competitive. There is only one gas fired rotisserie—the HUMPHREY ROTISSERIE, utilizing the famous Humphrey Super-Combustion burner.

Write now for full particulars.

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WESTERN GAS

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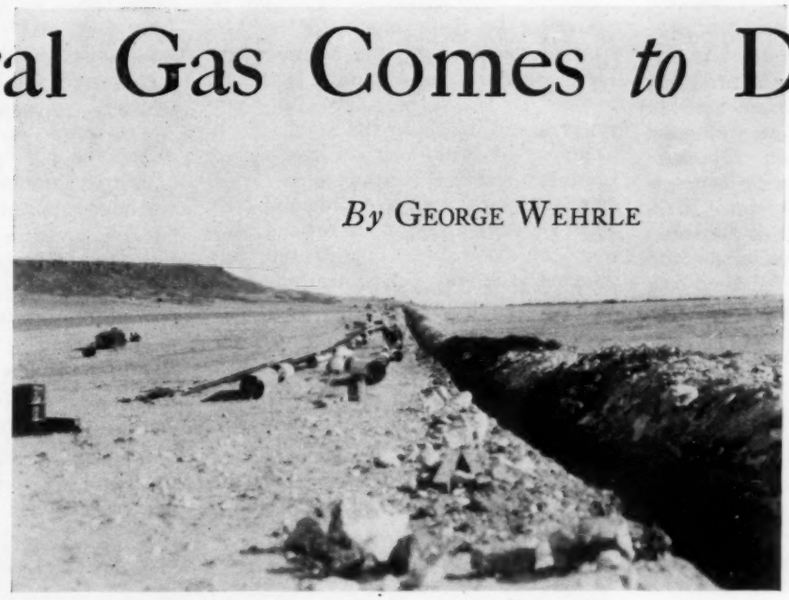
A Monthly Journal of the Gas, Gas Appliance and Natural Gasoline Industries in *Western America*

SAN FRANCISCO LOS ANGELES DALLAS

Natural Gas Comes *to* Denver

By GEORGE WEHRLE



RIGHT: Looking southeast along the Amarillo - Denver line, just above the drop in the valley of the Cimarron River, about 15 miles east of Branson, Colorado.

Mr. Wehrle, author of the accompanying article, is superintendent of the gas department for the Public Service Company of Colorado, with offices at Denver

ONE of the old Scotch bards once wrote—"The best laid plans of mice and men gang aft aglee." It is not quite two years ago that the writer prepared a paper for presentation at the Annual Meeting of the Pacific Coast Gas Association, entitled "Approaching the Ideal Gas Manufacturing Process," in which was described a plant then in process of construction in Denver. Today we are within hours of the time when this ideal plant, or such part of it as was installed, will be a lot of idle machinery, for natural gas for Denver is almost here. Gas from the Amarillo, Texas field will be turned into the distributing mains of Denver and Pueblo about July 1st, after a period of construction time only a little over six months since the first ground was broken on the 340-mile line.

While the possibility of supplying Denver with natural gas from the Amarillo field has been under discussion for several years, it was not until early in the year 1927 that interests of strong financial character established the fact of economic feasibility of the venture, and negotiations were begun in earnest between the Standard Oil Company of New Jersey, the Prairie Oil & Gas Company, and others and the Cities Service Company, and its subsidiary, Public Service Company of Colorado, for a supply of natural gas for Denver and Pueblo, both of which are served by Henry L. Doherty & Company properties. Before the economic feasibility of the project was established it was necessary, however, to secure the large industrial load of the steel mills of the Colorado Fuel & Iron Company, at Pueblo.

With the granting of a 20-year franchise to Public Service Company of Colorado by the taxpayers of Denver on February 8, 1927, a way was provided for supplying Denver with natural gas. This was followed on September 5, 1927, by the passage of an ordinance by the Denver City Council establishing rates and contract whereby the provisions of the franchise might be carried out. The domestic rate established was as follows:

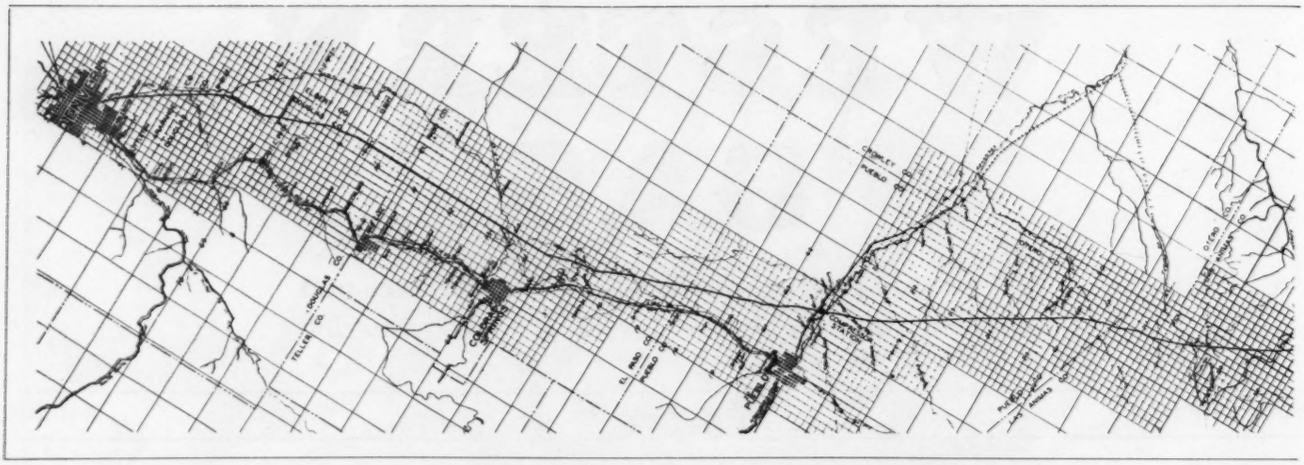
First	400 cu. ft. or less	90 cents, net
Next	600 cu. ft. or less @	15 cents per C cu. ft.
Next	1,000 cu. ft. or less @	12 cents per C cu. ft.
Next	1,000 cu. ft. or less @	7.5 cents per C cu. ft.
Next	7,000 cu. ft. or less @	6 cents per C cu. ft.
Over	10,000 cu. ft. or less @	5 cents per C cu. ft.

A similar franchise was later granted

ANOTHER MAJOR GAS transmission enterprise has been pushed to completion in record time, and the constantly lengthening reach of natural gas has extended itself to include population centers of Colorado—the gas carrier traversing sections of three states to reach its final destination, the city of Denver.

COLORADO, RICH in mineral resources, can harness natural gas to its purpose and work industrial miracles, and domestic housheating, on which commendable progress has already been made in Denver, will gain by leaps and bounds. The steel mills of Pueblo are being linked with the Amarillo-Denver line and will form the cornerstone of the industrial load.

MR. WEHRLE, IN THIS interestingly written summary of the natural gas project, gives particulars on the line itself and also upon the careful preparations made for the change-over to natural gas service in Denver.



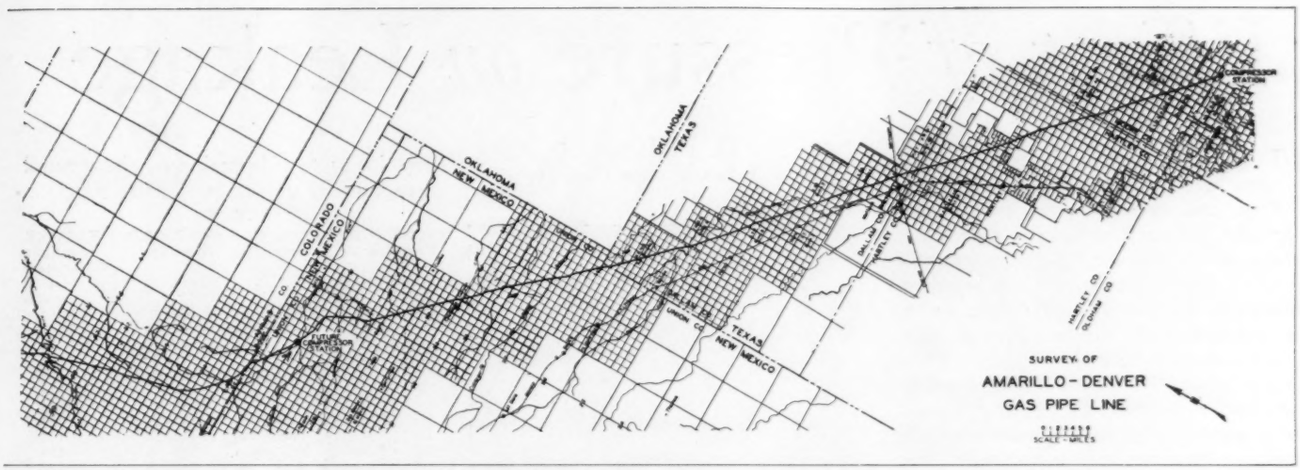
to the Pueblo Gas & Fuel Company, establishing the same rates as in Denver, on April 6, 1928.

After the passage of the natural gas ordinance in Denver, contracts between Public Service Company of Colorado, distributors, and Colorado Interstate Gas Company, suppliers, were consummated and things began to hum. Practically all of the survey work had been done, and contracts for materials and work were quickly completed by Ford, Bacon & Davis, Inc., engineers for the pipe line interests. The Oklahoma Contracting Company, of Dallas, Texas, secured the contract for the line from the field to Clayton, New Mexico, and Williams Bros., Inc., of Tulsa, Oklahoma, secured the contract for the lines in Colorado and New Mexico. Ground was broken at Devine, Colorado, near Pueblo, on December 13, 1927. Despite the fact that the work was started in the dead of winter, at an elevation nearly a mile above the sea, practically all of the main pipe line was completed before the first of May, thus establishing the claims of Colorado to an ideal winter climate.

The Amarillo natural gas field is known to be the largest gas field as yet discovered in the world. To secure an adequate supply for the Colorado project, gas rights were secured for 350,000 acres, or about 346 square miles, in a single block, upon which are located 25 wells, having an aggregate open flow of 625,000,000 cu. ft. of gas daily. The gas has a heating value of about 1070 B.t.u. per cu. ft., with a specific gravity around .67. It is free from sulphur. The gas properties are held by the Southwestern Development Company.

The pipe line to Denver is 340.7 miles long, consisting of 235.7 miles of 22-inch pipe from the Amarillo field to Pueblo, and 105 miles of 20-inch pipe from Pueblo to Denver. The line for the most part is laid over rolling plains, although considerable rough country was traversed in Southern Colorado and New Mexico. The line is controlled by the Canadian River Gas Company, owned by the Southwestern Development Company, in Texas, and by the Colorado Interstate Gas Company, owned jointly by the Standard Oil Company of New Jersey, Cities Service Company and the Southwestern Development Company, in Colorado and New Mexico. A compressor station and gasoline extraction plant have been constructed at Bivin, Texas, near the field, and other compressor stations will be constructed as required at intermediate points between the field and Denver. The line will operate under 350 lbs. pressure and has a maximum carrying capacity around 80,000,000 cu. ft. of gas per day. Pipe used is plain-end steel pipe, 5/16-inch in thickness, and for the most part joined with Dresser couplings. Soil analyses were made every 1000 feet, and the pipe coated with a bitumastic enamel, in accordance with the showing of the samples of soil in which the pipe laid. Every precaution was taken to insure a permanent job. When the pipe passed under roadways or railroad rights-of-way, it was welded, reinforced by strapping, and tested to 500 lbs. pressure and cased. Where the line crossed the larger rivers, such as the Arkansas and Huerfano, manifolds bowed up stream were used. These manifolds consist of six or seven ten-inch pipes, valved at either side of the river. The pipe is one-half inch thick, screwed and coupled, with a collar leak clamp over each joint. River clamps, weighing 1550 lbs. each, were used on each joint.

Jack hammer drilling in ditch east of Branson, Colorado, on Denver line.



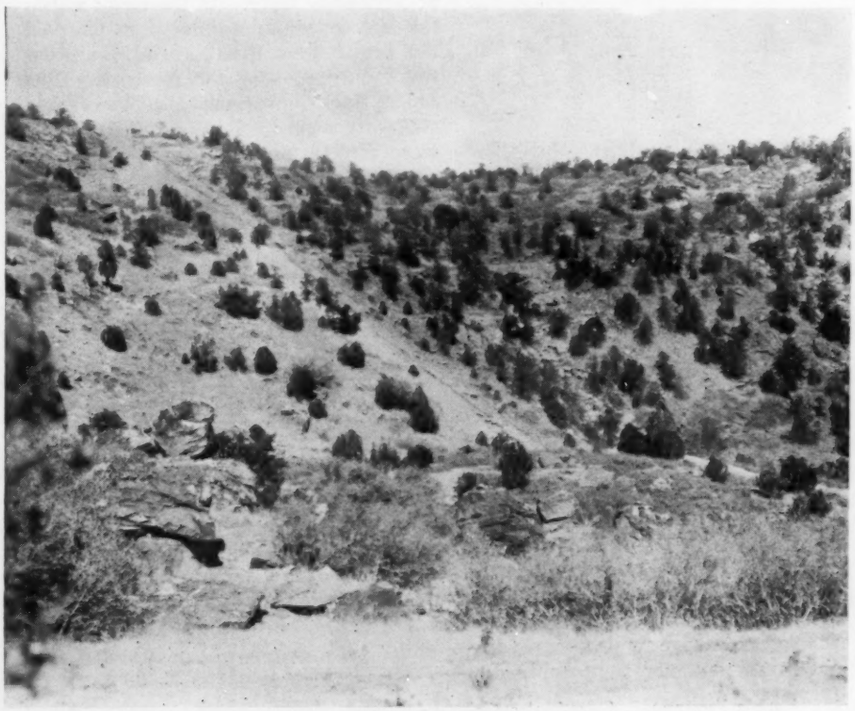
While the work was scheduled to be done by September 1, it was finished over two months ahead of this set completion date. It is claimed that every record heretofore made in laying a line of this size was broken by the contractors employed. Although record time was made on the job as a whole, many difficulties were experienced, nevertheless. A considerable portion of trench had to be blasted from solid rock, and several canyons were crossed where the pipe had to be let down from the top on skids. Twelve miles of the line north of Colorado Springs was laid through a densely wooded area, known as the Black Forest, where large trees had to be removed. The largest and most difficult problem encountered was that of transportation, due to the distance between railroads and towns. A fleet of approximately 100 trucks was used in the work. A force of around 2000 men was employed throughout the winter.

While work on the main line was in progress, the distributing companies in Denver and Pueblo were also busy. In Denver nine miles of 20-inch intermediate pressure mains and over a mile each of 8-inch and 10-inch pipe have been installed from the town border station to the governor stations. The intermediate pressure lines were welded and coupled, four lengths of pipe being welded together on top of the ground, lowered into the trench with a crane, and coupled.

Five governor stations and six governors will be used at the outset, with other stations added as the load grows and the intermediate pressure system is extended. Extensive reinforcement of the low pressure distribution system is planned to handle the large heating load anticipated. It is estimated that 4000 house-heating installations will be in use during the next winter seaon. It is also expected that gas will be extensively used in the industrial plants of Denver.

Plans have all been completed for the adjustment of appliances for use of natural gas and the adjustment crews are awaiting the signal to proceed with their work. Since the change is from a 400 B.t.u. gas to a 1070 B.t.u. gas, every orifice must be replaced on the 200,000 appliances in use in Denver. The method of procedure is to divide the city into ten districts by a separation of mains. Natural gas will be turned into a district at a time and all adjustments made in that district before proceeding to another one. It is calculated that from three to six days will be required to change over the respective districts and from 30 to 40 days to change over the entire city.

Preparing for the change-over has consumed several months. The first requirement was to recruit a force of 300 men, of proper qualifications. While this was not an extremely difficult task, it was of utmost importance, and "many were called but few were chosen." After the men were selected they were put through a training school, in which they were taught the elementary peculiarities and requirements of gas company work, and particularly that of adjustment of appliances and complaints under any and all conditions. Part of the training was carried on in the Fitting Shop Laboratory, where every known condition that might occur on the customers' premises was reproduced, and part of it was obtained while serving as helpers to experienced trouble men. After passing the first examination, the men were assigned to squads for inspection of each customer's premises to as-



This hillside, below Rock Rim, is typical of some sections traversed by the line.

(Continued on Page 50)

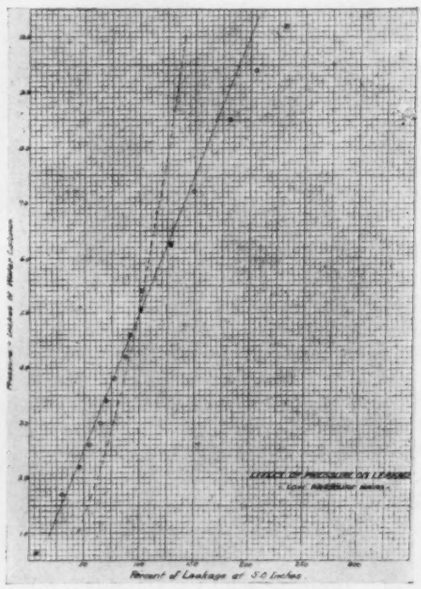
Effect *of* Pressure *on* Leakage

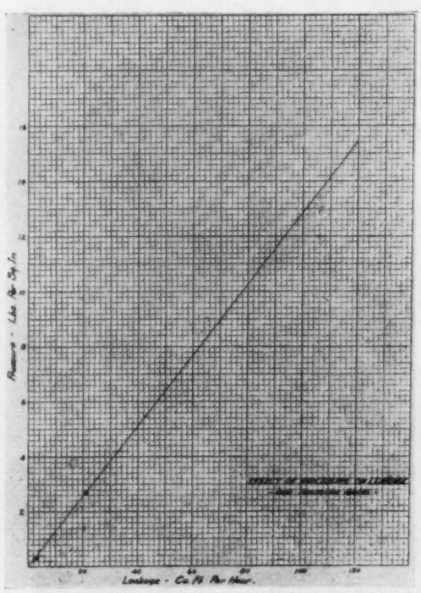
By D. B. LARSON
*Portland Gas & Coke Company**

IT has been recognized that the relation between pressure and leakage from underground pipe lines varies from the ordinary orifice or pipe flow condition wherein the volume is proportional to the square root of the pressure difference, but the available data as to the amount and explanation of this variation seem to be rather limited. This matter is one of considerable importance under present distributing conditions, particularly on high or medium pressure systems where almost any change or addition to the system involves increasing or decreasing the pressures. Where conversion from low to high pressure or vice versa is contemplated the leakage question becomes one of especial concern. If the pressure in the system, for instance, is to be changed from seven or eight inches of water column to 30 lbs. per sq. in., which is an increase of about 100 times in pressure, it is decidedly of interest to know whether the leakage is to be expected to increase ten fold as would be the case if it followed the orifice flow formula, or whether it will increase more or less than this amount.

In order to obtain more definite information as to this relation a series of tests were made by varying the pressures on several isolated sections of main and measuring the leakage at each pressure. As far as possible all other factors which would tend to affect the leakage were held constant during the time the observations were being made. There was no measurable change in ground temperatures during the period of any of the tests and the meter locations were so protected as to prevent any appreciable heating of the gas while passing through the meters. The mains selected were lines on which the leakage was normal; it being desired to avoid any unusually large leaks on account of the possibility that such extraordinary leaks may follow a different course than those of normal size. The chance of a change in specific gravity due to an air-gas mixture of varying proportions was eliminated by making the tests on sections of main still connected to the system rather than utilizing abandoned lines which had been allowed to fill with air. Oil gas of 0.35 sp. g. was used in all cases.

Observations made during wet weather or on the day following a rain were ruled out as it was found in preliminary tests that the leakage varied in a decidedly erratic manner during a rain. Table No. 1 has been included to illustrate this effect. It will be noted here





that the leakage was almost three times as great in the afternoon as it was at the same pressure in the morning, the variation obviously being due to the decrease in water content of the soil. This emphasizes the prominent part which the ground resistance plays in determining the amount of leakage, and indicates that the increased leakage which is usually noticed in the summer is probably due principally to a lowering of the ground resistance by drying out of the soil.

*Delivered at the Vancouver, B. C., regional conference of the Pacific Coast Gas Association, held June 6 and 7, 1928.

TABLE NO. 1

TEST MADE DURING UNSETTLED WEATHER

Pressure (In. water)	Time	Weather	Leakage (Cu. ft. per hr.)
2.2	9:00 to 11.00 a.m.	Rain	56
2.6	11:00 to 11:15 a.m.	Heavy	88
2 6	11:15 to 11:30 a.m.	inter-	56
2.6	11:30 to 11:45 a.m.	mittent	32
2.6	11:45 a.m. to 12 m.	showers	80
3.2	12 m. to 1:00 p.m.	Clearing	124
3.4	1:00 to 2:00 p.m.	Fair	168
3.6	2:00 to 3:00 p.m.	Fair	203
2.2	3:00 to 3:30 p.m.	Fair	144
2 0	3:30 to 3:45 p.m.	Fair	128
2.9	3:45 to 4:00 p.m.	Fair	180

The procedure followed in making the tests was to set a meter of appropriate size in series with a governor or valve for pressure control between an isolated section of main and the gas supply. After observing the rate of flow for a certain period at one pressure the governor or valve setting was changed and an observation made at the new pressure, all other conditions remaining the same. This change of pressure was repeated until the range available was covered.

Tables Nos. 2 and 3 give the results of two tests made on low pressure cast iron mains at pressures ranging from 1.7 to 10.2 inches water column. The observed leakage in percentage of the leakage at 5.0 inches has been plotted against the pressure in the accompanying graph. The dotted line drawn through the point plotted for the leakage at 5.0 inches represents the trend which the leakage would follow if it observed the orifice flow formula and varied as the square root of the pressure. The solid line represents the theoretical course it would follow if the variation were directly as the pressure instead of the square root. The close agreement of the plotted points with the latter line shows that the leakage did vary in direct proportion to the pressure.

TABLE NO. 2

TEST ON 500 FT. OF 8-IN C. I. MAIN—LEAD JOINTS

Pressure (in water)	Leakage (Cu. ft. per hr. at 5.0 in.)	Per cent of leakage at 5.0 in.
5.4	15.7	101
5.0	15.6	100
4.6	14.3	92
4.2	13.8	88
3.8	12.1	77
3.4	10.9	70
3.0	10.2	65
2.6	8.5	55
2.2	7.2	46

TABLE NO. 3

TEST ON 4100 FT. OF 4-IN. C. I. MAIN—LEAD JOINTS

Pressure (In. water)	Leakage (Cu. ft. per hr. at 5.0 in.)	Per cent of leakage at 5.0 in.
10.2	14.5	232
9.4	12.8	205
8.5	11.4	182
7 2	9.3	149
6.25	8.0	128
5.05	6.3	101
1.7	1.9	30

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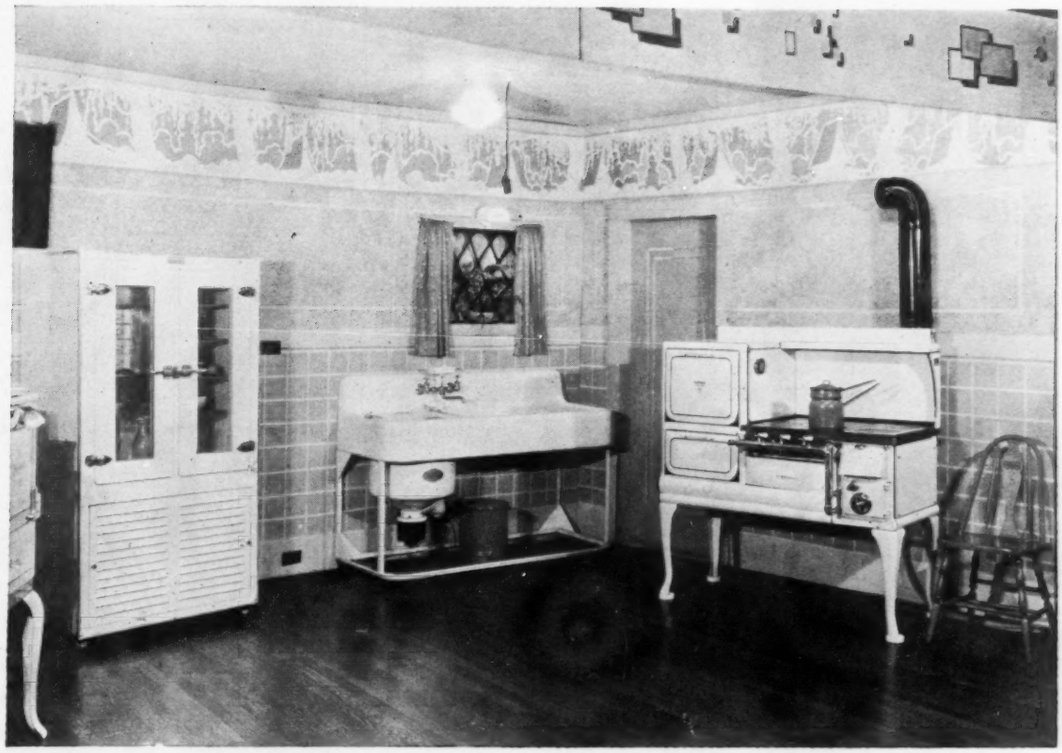

One corner of the "Pacific Service Kitchen"

A Modern Kitchen Goes *on* Tour

By ELLA M. LEHR
Pacific Gas and Electric Company

COOKING three meals a day—three hundred and sixty-five days of the year—for innumerable years—and for one individual (unless, of course, one is quite modern and changes one's partner as fancy demands!) is a tiresome job at best, and if anything can be done to make the daily round of housekeeping duties less irksome, it's certainly time for someone to take a hand.

A national survey was taken a short time ago, to find out, perhaps, just what was wrong with the American home. Some of the revelations were truly startling. Mrs. United States, it was shown, is not half so interested in freeing her home of drudgery as in relieving it of its monotony. She knows (and wants to know) more about radios, automobiles, libraries, Freud, and modern thought than she knows about the local water, gas and electric supply, and—predicts the survey—she'll go on using for another fifteen years her weak-kneed, broken-down gas range so that Son Richard may have saxophone lessons. Although she will not wear a last year's hat, she is using her grandmother's methods of housework.

It would seem then, that a follow-up campaign to show the conservation of a woman's strength and time through better home appliances and possibly too, to check the exodus away from the home and its responsibilities, would be a most noteworthy piece of work, and it was with this in mind that the San Francisco Section of the California Federation of Women's Clubs came to the Pacific Gas and Electric Company asking for co-operation in bringing before as many women as possible a knowledge of modern home equipment. It was to be a purely educational effort, commercialized in no sense of the word—and—well, here was a chance for a public utility to render a distinct service.

On January 20th, the "Pacific Service Kitchen" made its initial appearance in Solano County and was greeted by innumerable "Ohs," "Ahs," and other gasps of feminine admiration from an enthusiastic audience.

Modern as a 1928 flapper, and as gaily garbed, the kitchen holds all that culinary femininity has always hoped for and seldom had. Color abounds—greens and blues softly blended in walls and wood-trim, a gay color-note of orange appearing in fluttering drapes, above a casement window and in tiny high-gabled houses in the border; utensils, flour and sugar containers, garbage can and spatula talk out at one, joyfully, but subtly, in the same vivid tone.

And the equipment! No discouraged young wife would ever go back to home and Mother were such a kitchen as this her own!

There is that nice, bit of life's embroidery—the temperature controlled gas range, and the gas water heater, mechanical refrigeration, mixers, and a dishwasher. The lighting is the dream of all women who ever worked in a dark gloomy kitchen.

Accompanying the set is a table of small appliances of varied and sundry nature, and a general exhibit of gas and electric equipment.

Under the auspices of the California Federation of Women's Clubs, featured as a Better Homes program, the Pacific Service Kitchen appeared in thirteen towns, traveling from the Switzerland of America—Lake County—and well into Monterey County, spreading the gospel, so to speak, of better and happier homes. Approximately 2,200 women attended the meetings.

Oh, no—it was not a "still" display. Two feminine representatives of the Home Service Department of the Pacific Gas and Electric Company accompanied it! During the two sessions of

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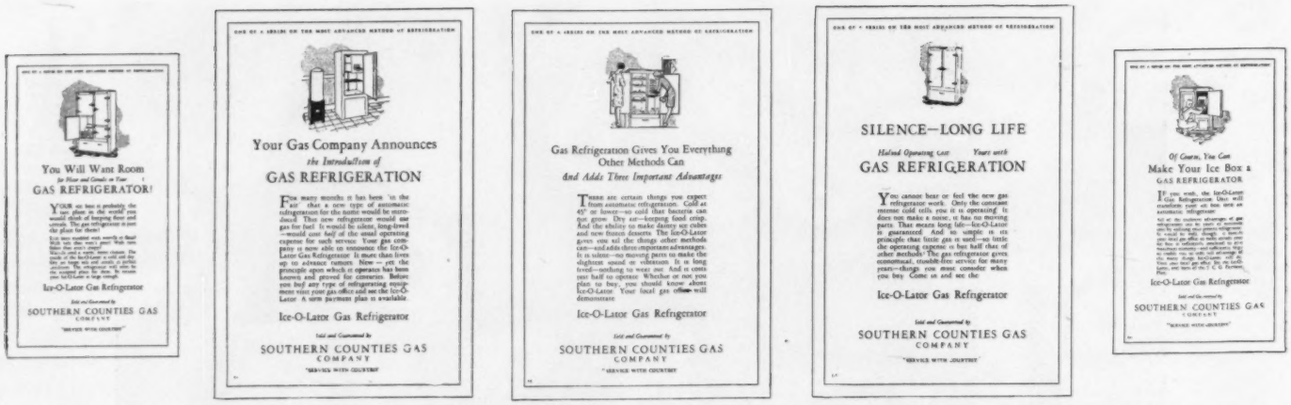


Five examples of gas refrigeration copy, taken from a series of advertisements prepared by the Southern Counties Gas Company

Advertising that *Pays*

By LAWRENCE RAYMOND

Southern Counties Gas Company

PRESIDENT CALVIN COOLIDGE, in a recent luncheon address before a group of prominent business men, said: *"Advertising is the backbone of national prosperity."*

Advertising is the development of the natural trend in business. It has become a vital part of sales, an important factor in raising the general standard of living, in connecting consumer and dealer, and in joining cities, states and nations together.

How does the public utility fit into the advertising scheme of things?—for certainly any agency as broadly useful as is advertising must have a special application for the utility. To illustrate by example:

The Southern Counties Gas Company does extensive advertising over its entire system, consisting of more than 80 cities and communities in five Southern California counties, namely Los Angeles, Orange, Ventura, Santa Barbara and San Bernardino counties, gas being served to 122,000 consumers. Its advertising accomplishes a three-fold purpose: the building of goodwill for the corporation as a public utility; the sale of appliances, and the stimulation of the use of gas as a fuel. Even a gas company must keep pace with modern business progress or be left behind.

Merchandising standard approved gas appliances, the Southern Counties has materially increased its sales during the past three years through consistent advertising and a definite sales plan.

Commercial and Advertising Departments work hand in hand and give every possible aid to the sales organization. Advertising support for the salesman includes newspaper display, direct mail, window and floor displays, billboards, and bill inserts, booklets and other literature.

This certificate, originated to tie in with Southern Counties Gas Company sales and advertising, guarantees quality of materials, workmanship, and installation of appliances sold by that utility.

With only slight increases in our advertising budget, due to increases in the number of meters on the system, but with a well-planned sales campaign and a definite advertising plan, our company is building merchandise peaks where valleys were before. Merchandise sales have increased 223 per cent in two years. Already, in the first four months of this year, the merchandise sales show a gain of 18 per cent over last season to date. The following figures, by way of comparison of sales for 1925, 1926 and 1927, prove convincingly what can be done with a well organized merchandise plan, where the Sales Manager and Advertising Manager worko in close harmony.

Year	Ranges	Space Heaters	Water Heaters	Value of Sales
1925	1,128	894	102	$127,000
1926	1,953	1,956	176	230,000
1927	3,134	2,067	1,100	421,000

Our display advertising budget is worked out on a meter basis. The total budget is broken up into percentages to be used for display space for specific items. We are spending, this year, 13.33 per cent for goodwill, institutional and policy advertising; 6.67 per cent for gas refrigeration, 20 per cent for water heater sales promotion, 20 per cent on space heaters and house heating, and 40 per cent on gas ranges. The range appropriation is broken up and 50 per cent of that part of the budget is used to advertise the leading gas range handled by the company, the remaining amount being split between the other two types of ranges.

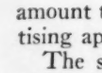
A growing realization of the value of the direct advertising medium is demonstrated by the number of gas companies which are giving it an important place in their sales appropriations for 1928. The Southern Counties Gas Company, while having previously used direct advertising for special purposes, is this year giving it a more prominent place in the advertising budget. Due to the excellence of the prospect list, the soundness of the advertising, and the care exercised in following up leads, the program is meeting with more than usual success. District managers report that salesmen are enthusiastic over the advertising support they are receiving in their work, which is reflected in the new business reports. We are giving direct advertising its first opportunity to prove its effectiveness. The Direct Advertising budget, which includes our three-piece direct-by-mail campaign, will

amount to 33 per cent of the total advertising appropriation.

The sales department has set a goal of $550,000 in gross merchandise sales for 1928 and has laid a very definite merchandising campaign. The year has been set off into specific divisions and there are seven definite advertising campaigns designed to tie-in with the seasonal sales efforts. These seasonal demarcation lines are very specific and their timely appeals are carefully observed.

Before entering a detailed description of the year's advertising program, it should be introduced that the Southern Counties Gas Company specializes in quality gas appliances that are *triple tested*—that is, they have passed the scrutiny of three major organizations. First, the American Gas Association has subjected them to rigid tests and has stamped them with the "Blue Star" seal of approval; second, the Good Housekeeping Institute has given them its endorsement; third, our own gas company, as the result of its experience with thousands of installations, adds its recommendation, so that the appliances handled are *triple tested* for the consumer's protection. This "triple test" motif runs through much of the company's advertising.

The first advertising campaign was designed to impress the consumer with the importance of owning only "triple tested" appliances. A series of seven newspaper ads were composed to run in sequence. The first three, respectively, announced the "triple tested idea," "the three important bureaus that indorse the customer's good judgment when she purchases an appliance from her local gas company," and the *"Certificate of Satisfaction"*—this certificate being a written guarantee that the appliance, when purchased, is perfect in quality of materials, workmanship and installation. The fourth, fifth and sixth individual advertisements pointed out that the consumer's gas range, water heater and space heater should be "triple tested" and that the local gas company's three major appliances are all "triple tested" for their protection. The Triple Tested "check" used in all advertisements, is a check mark with the letters S. C. G. running through the symbol and it assures the public approved appliances, expertly installed, properly serviced. To close this series, a large ad was run in the daily papers telling the public that a "Complete Exhibit of Triple Tested Gas Appliances" is maintained at the local gas office.



It was deemed advisable to open the year's advertising program with the above series, stressing approved appliances and informing the consumer that the local gas company was a logical place to purchase gas appliances for all domestic purposes.

RIGHT: These four-page, three-color direct-by-mail letters figure strongly in this year's advertising of the Southern Counties Gas Company.

Immediate Hot Water!.....
"We're Going to be Comfortable this Year!"
HOTZONE
These Reasonably Priced Humphrey Radiantfires Guard You Against the Coldest Days!
YOUR HOME DESERVES A
BEAUTIFUL NEW RANGE!
ROPER

Our next series of newspaper ads consisted of eight pieces of copy on *hot water* and the advantages of automatic hot water heaters. Again the "triple tested" idea was brought out prominently in each advertisement. The points stressed in this series were the small cost of ownership and operation, the written guarantee or "Certificate of Satisfaction," "Eighteen Months to Pay for a Lifetime of Hot Water Service," the fact that "A Modern Water Heater Makes Your Home Worth More," the "Liberal Trade-in Allowance," "Free Installation," "No Interest Charges" and "Small Monthly Payments Along With the Gas Bills."

Two thousand water heaters is the sales quota for this year. In 1925 our company sold 102, in 1926 only 176 and then in 1927 with an intensive campaign, sold 1,100 Blue Star water heaters. During the first three months of last year, the water heater sales were only 76 and during the same period of this year the salesmen sold 282, this increase being accomplished without any special price or terms inducement to the public.

Our third advertising campaign was that on *"Gas Refrigeration,"* which broke April 15th and ran for five weeks. Gas refrigeration—an advanced method —must be pioneered when the gas company turns to merchandising it. Therefore, we decided that it was imperative to announce formally to the public, the "Introduction of a New Type of Automatic Refrigeration for the home that would use gas for fuel." It would be *"silent," "long-lived"*—would *"cost half* of the usual operating expense for such service."

The public were invited to come into their nearest office and see the latest gas invention demonstrated. We explained in the newspaper display columns that "Gas Refrigration Gives You Everything Other Methods Can" and *adds three important advantages,* namely, that it is *silent*—no moving parts to make the slightest sound or vibration; that it is *long lived*—nothing to wear out; and that it brings *low cost of operation.* Furthermore, we informed the housewife that she can make her icebox a gas refrigrator. Also, that she will want room for food, flour and cereals in her mechanical refrigerator, all possible with the gas machine. Again, mention was made of the temperature of the refrigerator—40° or lower—so cold that bacteria cannot grow, and a dry cold air, keeping food crisp. The ability to make dainty ice cubes and new frozen desserts was naturally included.

All of the gas refrigration advertising copy was designed to pave the way for the salesmen. We expect to sell 150 refrigerators this spring and summer, and from present indications there will be little difficulty in attaining that goal.

At the present time we are running a special sale on the Tappan gas range with the insulated oven in color tints. An extra trade-in allowance for the old stove is the key to the sale and our advertising is devoted to this.

Additional newspaper advertising on automatic storage water heaters will appear throughout the year to give continual support to the salesmen in their campaign to place 2,000 modern heaters on our lines.

In the two summer months, July and August, the commercial department is offering a 10 per cent reduction on all gas appliances, with another 10 per cent for exchange credit, with free installation and no interest. Again the advertising will support the sales efforts with appropriate copy.

We are planning to play up gas refrigeration again in the early summer.

The fall heating campaign breaks September 15th and is one of the most important individual sales campaigns on our schedule. Space heaters and floor and unit furnaces are excellent load builders.

From November 15 until December 24 we will have a drive on gas ranges, featuring them for Thanksgiving cooking and as ideal Christmas gifts.

(Continued on Page 45)

Analysis *of* Natural Gas *and* Natural Gasoline

By W. W. ROBINSON, JR.

*Chief Chemist**
California Gasoline Company

THE NATURAL gasoline industry has been in existence some 25 years, but it has only been recently that the problems of the industry have been attacked to any appreciable extent from a scientific standpoint. In the past two years scientific research has given information as to the value of natural gasoline as a component of motor fuel. It is now time that scientific research be directed toward the solution of what is a very important problem affecting the economic life of the industry. This problem is the analysis of natural gas and gasoline to determine their hydrocarbon constituents.

W. W. Robinson, Jr.

Absolute data, applicable to equipment design, and manufacturing operations, with the rapidly growing importance of rectified gasoline, must, of necessity, be available to all in the near future to replace the questionable empirical data and unstable assumptions so generally accepted.

On all sides are heard discussions and opinions which are so conflicting that it is evident that a great deal is not yet known as to the exact composition of natural gas or gasoline, nor the relation which a virgin gas composition bears to absorbability in oil, or what specific properties may be expected in the gasoline derived from it.

In the accompanying discussion wherever the terms gas or gasoline appear, they shall be understood to mean natural gas and natural gasoline. Where occasion arises to mention gasoline as made by the crude oil refiner, it shall be called motor fuel.

Gas as ordinarily treated in a gasoline plant contains relatively large percentages of the hydrocarbons, methane and ethane, and relatively small percentages of the hydrocarbons propane, butane, pentane, hexane and higher. Most of the published analyses are based on the assumption that the hydrocarbons contained in the gas are of the paraffin family, and while it has been proven more or less definitely that this condition does not, by any means, hold true for all gases, for purposes of discussion it will be satisfactory to assume that the hydrocarbons are all normal paraffin hydrocarbons, or, if they are not, that they will fall into the same boiling point groups as the normal paraffin hydrocarbons.

THREE GROUPS OF HYDROCARBONS

Having made this assumption, we can proceed to subdivide the hydrocarbons contained in the gas which is treated in gasoline plants into three distinct groups. In Group 1 can be placed all the methane, ethane and propane or equivalent fractions contained in the gas. These hydrocarbons are fixed gases at normal temperatures and enough data are available for us to conclude definitely that these hydrocarbons are "undesirables" and should not in any case be included in gasoline. In Group 3 can be placed pentane, hexane, heptane and all of the other higher boiling point hydrocarbons. All available data prove conclusively that these hydrocarbons are "desirables" and should unquestionably be included in gasoline.

In Group 2, we can put butane (and all other hydrocarbons having the same boiling point and similar properties). This group is not all desirable in gasoline. A certain percentage of the total amount of it contained in the gas is desirable and should be included with the pentane and higher in the finished gasoline. The balance, at least for the present, will have to be rejected, along with the hydrocarbons in Group 1, as undesirable. The exact percentage of Group 2 which can be retained in gasoline depends upon conditions. It depends upon the relative quantity of Group 3, or desirable hydrocarbons, which is available in the gas, and upon the specifications by which the finished gasoline product is controlled.

The status of Group 2 might be termed "questionable," in that above certain limits of concentration, it can cause trouble closely akin to that of "wildness." Therefore, the exact determination of the percentage of Group 2 which may be included in the finished product is of great importance, and makes it essential that each manufacturer know, with precision, the percentage of Group 2 and Group 3 in both gas and gasoline, the necessity of knowing Group 1 being self evident.

It is of great commercial importance to improve over the existing commonly used methods of gasoline and gas analysis, as represented by vapor pressure, Engler distillation, and the atmospheric and pressure charcoal tests. An exact and more fundamental method is needed.

Why should a quick, accurate method of determining the hydrocarbon constituents present in gas and gasoline be developed? What can be done with the method after it has been developed, and will the results be justified by the cost? There are many reasons why such a method is desirable. We have only to look away from this industry a moment to see that as a result of competitive conditions, questionable empirical data have been replaced today in practically all other industries by that which is scientific and accurate, and it should be realized that without concrete and indisputable information concerning the chemical composition of gas and gasoline, the gasoline industry must continue to struggle along in the dark as it has in the past.

ECONOMIC PLANT DESIGN

The first place where it would be desirable to have an accurate means of determining the composition of gas would be when new fields were opened up and it became advisable to consider the treatment of the gas in a gasoline plant. Analysis would reveal the presence of undesirable compounds and would enable the prediction of the yield of specification gasoline which could be produced from that particular gas. The information obtained from the analysis would facilitate the economic design of a plant to recover the gasoline from the gas.

To meet competitive conditions today it is necessary to build a plant to produce the desired results at the lowest possible

(Continued on Page 47)

*Delivered before the annual convention of the Natural Gasoline Association of America, Tulsa, Okla., May 22-24.

LEFT: General view of North Shore Gas Company semi-high pressure transmission line taken a quarter mile from Lake Michigan. Note how close water is to surface. CENTER: Ends of pipe were protected by welded steel plates and also thoroughly wrapped with canvas to eliminate dripping of sand inside the line. RIGHT: Showing sheet piling used at points where drips were installed. Use of lead joints on drop pots made this practice necessary as a safety measure.

North Shore Gas Company *a* Pioneer *in* Use *of* High Pressure Distribution

By J. H. HART
*General Manager, North Shore Gas Co., Waukegan, Illinois**

THE North Shore Gas Company was among the first to adopt high pressure distribution, its first main being installed in 1899. At the present time the company has somewhat over 200 miles of high pressure mains supplying gas to over 17,000 customers from the Illinois-Wisconsin State Line on the North, to Winnetka on the South, and Libertyville, Mundelein and Grays Lake on the West.

The company began the use of welded steel gas mains in 1916 and yearly since that time has increased the proportionate amount of welded steel mains laid until, for the last three or four years, we have standardized on this type of line for transmission purposes.

Our welded lines consist of all sizes from four-inch to 16-inch and our method of laying is practically the same in all cases. Plain steel pipe with proper beveled ends is ordered in carload lots and spotted at the nearest unloading point along the proposed transmission route so that drayage is reduced to the lowest possible figure. After pipe has been delivered to the proposed line the welders commence welding in two's thus making double lengths for some distance ahead of the trenching machine, which starts excavating at about the same time. Double lengths are welded together and joined to other sections and so on as long as pipe can be turned readily, thus allowing turning welds. Sections thus started are in turn tied into other sections by overhead welds until one continuous pipe is formed from valve station to valve station or fitting to fitting.

As little delay as possible is allowed between the excavating and dropping of pipe into the ditch thus avoiding as far as possible open ditches and caving. Definite instructions are issued calling for a double length of pipe to be thoroughly brushed out before it is welded into sections and where more than two pipes are welded together a square iron plate is tacked over the end to prevent foreign matter, rabbits or other small animals, getting into pipe line, causing obstructions in the completed main.

Valve stations on transmission lines through rural districts are approximately one-half mile apart, but in the more settled districts are placed somewhere between 1,000 and 2,000 feet, depending on local conditions.

On four-inch lines screw end gate valves are used with two 24-inch threaded one end nipples screwed into them; valve connections then formed are placed in the line with two expansion joints of Dresser or similar type, thus protecting valves from excess strain and stress and at the same time insuring easy replacement of valve stations at any time without delay.

On six-inch and larger sizes, two valves are used and connected the same way, but with a nipple threaded on both ends between them, thus giving a double shut-off. Blow down or test risers are provided on the connecting nipple between the two valves, thereby enabling ready access to the pipe line when it becomes necessary.

All lines are tested to about 70 pounds air pressure and joints are carefully gone over with soap suds to detect leaks, which are few and far between. After this test the protective coating is put on, which consists of a pitch base paint or some corrosion resisting paint and in some cases the pipe is spirally wrapped with muslin and a second coat of protective paint applied. After the pipe has thus been protected it is ready to be placed in the ditch, the pile is lowered without exercising any care whatever, paying no attention to the joints, letting them take the stress and strain that may be encountered in dropping the pipe into ditch by the easiest and quickest means. This method of procedure gives us a very good test on the ultimate strength of completed line, and I might add that in no case have we ever broken a welded joint.

As a further precaution against possible leakage, a second standing test is placed on the line over a period of not

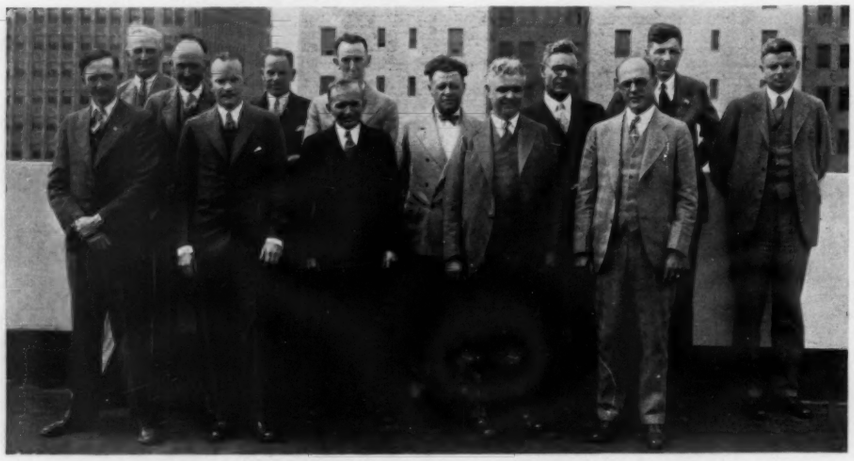
(Continued on Page 46)

*Excerpts from a paper read before the 1928 convention of the Gas Products Association

PACIFIC COAST GAS ASSOCIATION

447 Sutter Street, San Francisco, California

A Department Conducted by Clifford Johnstone, Executive Secretary



THE 1928 CONVENTION COMMITTEE

Rear row, right to left: L. M. Klauber, P. C. G. A. President; Wm. de Waard, Banquet Committee; J. A. Harritt, Executive Committee; W. A. Lambert, Hotel Accommodations; Forrest Raymond, Publicity Committee; R. C. Cavell, Entertainment Committee; D. H Perkins, Exhibit Committee; W. M. Thompson, Golf Committee. *Front row, right to left*: C. D. Weiss, General Convention Chairman; Al May, Registrations; D. L. Scott, Luncheons; W. D. Dickey, Golf; W. E. Frazer, Transportation

San Diego Ready to Play Host to P. C. G. A.

PLANS for the 15th Annual Convention of the Pacific Coast Gas Association are assuming definite proportions and members may expect a well balanced program that will be well worth "walking a mile for" if necessary, according to C. D. Weiss, general convention chairman. This year the convention, which will be held at the Hotel Del Coronado, September 17th to 20th, will feature an exhibit of the latest gas appliances as well as many new mechanical features that have already proved or will prove of valuable assistance to the manufacturer and distributor of gas. The San Diego Consolidated Gas & Electric Company is making a special effort to be the genial host and has arranged a program for Friday, September 21st, that will give the membership an opportunity to visit the various exhibits and to inspect the property of the San Diego company. The company will have on display earth working tools, transportation equipment and other machinery for the laying of gas mains.

Following is a complete list of the Convention committees:

CONVENTION COMMITTEES

C. D. Weiss, General Chairman
San Diego Consolidated Gas & Electric Co.

Executive Committee

C. B. Babcock, C. B. Babcock Company, San Francisco
R. C. Cavell, San Diego Cons. Gas & Elec. Co.
Mrs. R. E. Creveling, San Diego Cons. Gas & Elec. Co.
Wm. de Waard, San Diego Cons. Gas & Elec. Co.
W. E. Frazer, San Diego Cons. Gas & Elec. Co.
J. A. Harritt, San Diego Cons. Gas & Elec. Co.
Mrs. L. M. Klauber, San Diego Cons. Gas & Elec. Co.
W. A. Lambert, San Diego Cons. Gas & Elec. Co.
Alfred May, San Diego Cons. Gas & Elec. Co.
D. H. Perkins, San Diego Cons. Gas & Elec. Co.
Forrest Raymond, San Diego Cons. Gas & Elec. Co.
C. D. Weiss, San Diego Cons. Gas & Elec. Co.
D. L. Scott, Los Angeles Gas & Electric Corporation
W. M. Thompson, Reliance Mfg. Co., Alhambra

Hotel Accommodations

W. A. Lambert, Chairman, San Diego Cons. Gas & Elec. Co.
Otto Goldkamp, San Diego Cons. Gas & Elec. Co.
Thos. Blair, Coronado, California
A. F. Bridges, Southern Counties Gas Co., Los Angeles
R. S. Fuller, Pacific Gas & Elec. Co., San Francisco
W. M. Henderson, Los Angeles Gas & Elec. Corp., Los Angeles
C. R. Miller, Portland Gas & Coke Company, Portland
C. L. Murphy, South Coast Gas Company, Oceanside
B. G. Williams, Southern California Gas Company, Los Angeles.

Registrations

Alfred May, Chairman, San Diego Cons. Gas & Electric Company
G. W. Anderson, Magic Way Company, National City
J. H. Hill, Pittsburgh, Equitable Meter Company, Los Angeles
Wm. Maddock, Los Angeles Gas & Electric Corporation
W. H. Wright, San Diego, California

Transportation

W. E. Frazer, Chairman, San Diego Cons. Gas & Elec. Co.
F. M. Cota, San Diego Cons. Gas & Elec. Co.
H. W. Elder, San Diego Cons. Gas & Elec. Co.
F. W. Keller, San Diego Cons. Gas & Elec. Co.
B. R. Robertson, Robertson Brothers, San Diego.

Entertainment

R. C. Cavell, Chairman, San Diego Cons. Gas & Elec. Co.
C. F. Creelman, San Diego Cons. Gas & Elec. Co.
R. J. Phillips, San Diego Cons. Gas & Elec. Co.
L. B. Jones, Consulting Oil and Gas Engineer, San Francisco
K. C. Tomlinson, Pacific Meter Works, San Francisco

Golf

W. M. Thompson, Chairman, Reliance Manufacturing Company, Alhambra
Van E. Britton, Pacific Gas & Elec. Co., Oakland
W. D. Dickey, Pacific Meter Works, San Francisco
A. E. Holloway, San Diego Cons. Gas & Elec. Co.
R. M. McCalley, Portland Gas & Coke Co., Portland
W. S. Yard, Pacific Gas & Elec. Co., San Francisco
D. J. Young, Consulting Engineer, Tacoma, Wash.

Luncheon Programs

D. L. Scott, Chairman, Los Angeles Gas & Elec. Corp.
W. H. Barton, Portland Gas & Coke Co., Portland
R. L. Cardiff, Coast Counties Gas & Electric Company, Santa Cruz
J. A. Harritt, San Diego Cons. Gas & Elec. Co.
F. H. Holden, Sou. Calif. Gas Co., Los Angeles
C. H. Potter, Sou. Counties Gas Co., Los Angeles
Don C. Ray, Pacific Gas & Elec. Co., San Francisco

Banquet

Wm. de Waard, Chairman, San Diego Cons. Gas & Elec. Co.
J. A. Harritt, San Diego Cons. Gas Elec. Co.
E. W. Langdon, Sprague Meter Company, Los Angeles
Norman McKee. Sou. Counties Gas Co., Los Angeles
Byron Reinemund, San Diego, California

Exhibits

D. H. Perkins, San Diego Cons. Gas & Elec. Co.

Publicity

Forrest Raymond, Chairman, San Diego Cons. Gas & Elec. Co.
Ray Edwards, San Diego Cons. Gas & Elec. Co.
R. C. Fleisher, Bledsoe Furniture Company, San Diego
J. Charles Jordan, Pacific Gas & Electric Company, San Francisco
E. F. Ramsey, Los Angeles Gas & Electric Corp.

Convention Magazine

Mrs. Ruth E. Creveling, Editor, San Diego Cons. Gas & Elec. Co.

Ladies Entertainment Committee

Mrs. L. M. Klauber, Chairwoman

Mrs. J. A. Cannon	Mrs. D. H. Perkins
Mrs. M. B. Fowler	Mrs. W. F. Raber
Mrs. J. A. Harritt	Mrs. R. E. Thompson
Mrs. A. E. Holloway	Mrs. H. H. Watson
Mrs. H. R. Peckham	Mrs. C. D. Weiss

Engineers Handbook Is Progressing

WITH the permission of the Board of Directors, the Engineers Handbook Committee has employed M. A. Richford to assemble and check for publication the vast amount of data already collected for use in the handbook.

M. A. Richford

Mr. Richford came to the Association on June 18th and for the time being is working in the Association's San Francisco office although his duties will require him to take occasional trips to other sections of the Coast.

Mr. Richford has been employed for the past year as a cadet engineer by the Pacific Gas and Electric Company in its Oakland laboratory. He is a graduate of the University of Washington, class of 1926, receiving the degree of Bachelor of Science in Chemical Engineering. Prior to his graduation, Mr. Richford spent one year in the laboratory of the American Nitrogen Products Company at Seattle, Washington.

Committees Named

PRESIDENT KLAUBER has recently appointed several committees, each of which will fulfill an important function at the Coronado Convention. These committees are as follows:

Nominating Committee

F. J. Schafer, Chairman, Southern California Gas Co., Los Angeles
S. Waldo Coleman, Coast Counties Gas & Electric Co., San Francisco
Geo. L. Myers, Pacific Power & Light Co., Portland
E. L. Payne, Payne Furnace and Supply Company, Beverly Hills
B. S. Federsen, Geo. M. Clark & Co., San Francisco

Papers and Reports Committee

Henry Bostwick, Pacific Gas & Elec. Co., San Francisco
Geo. P. Egleston, H. R. Basford Co., San Francisco
A. E. Hall, Coast Counties Gas and Electric Company, San Francisco

Awards Committee

Accounting Section—A. E. Peat, Southern California Gas Company
E. N. Simmons, Los Angeles Gas & Elec. Corp.
Commercial Section—R. J. Thompson, Welsbach Company, San Francisco
C. M. Grow, Southern California Gas Company
Public Relations—W. F. Raber, San Diego Cons. Gas & Elec. Co.
Don C. Ray, Pacific Gas & Electric Company
Technical Section—J. E. Kelley, Pacific Gas & Elec. Co.
R. M. McCalley, Portland Gas and Coke Company
Mr. Raber will serve as chairman of the entire committee.

Association Research Fellowship

THE committee in charge of the Association's Research Fellowship at the University of California, composed of W. S. Yard, vice-president of the Pacific Gas and Electric Company, Prof. C. L. Cory, Dean of the Mechanical Engineering School, and Prof. C. B. Lipman, Dean of the Graduate School, has selected Charles William Quentel as the holder of this Fellowship for 1928 and 1929.

Mr. Quentel is a graduate of the Oakland Technical High School and the University of California, receiving the degree of Bachelor of Science from the College of Mechanics in 1928. He is majoring in Mechanical Engineering, and received unusually high grades while a student at the University.

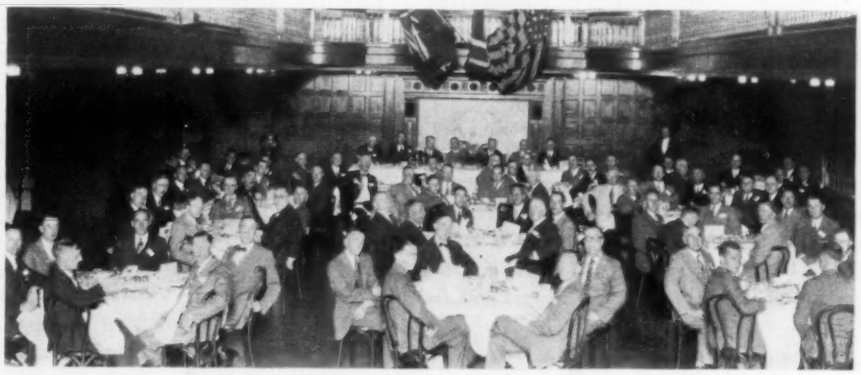
Mr. Quentel will be given a research problem dealing with the utilization of gas for his thesis subject for the year.

Morgan's Second Volume On Manufactured Gas

PROF. JEROME J. MORGAN of Columbia University, with the backing and cooperation of the American Gas Association, has performed a distinct service to the gas industry in the publication of his two volume treatise on Manufactured Gas, the second volume of which is now ready in bound form.

The first volume, previously reviewed in *Western Gas,* treated the problem of production and chemistry of gas. This second volume takes up fully matters of storage, distribution, compression, metering, sales, domestic and industrial appliances, and utilization. It also contains chapters on testing of gas and research in gas chemistry, safety and accident prevention, accounting and statistics, and the principles of rate making. The final chapter deals in an exceptionally enlightening way with the broad subject of public relations.

These two books form the text followed in the Columbia University Correspondence Course in Gas Engineering, and in the preparation of his work Professor Morgan has had the assistance of the leading gas engineers and executives of the country. Both the course and the text on which it is based can be heartily recommended as being the latest and best now available to men who desire to know more about this great industry.



Northern Conference delegates gathered at the stag dinner, Vancouver, B. C., June 6th

Northwesterners Hold Forth at Vancouver in June

EIGHTY Association members, most of them from companies of the Northwest, registered at the Northwest Regional Conference, held at Vancouver B. C. June 6 and 7. There were 77 present at the dinner held Wednesday evening at the Vancouver Hotel.

Program and arrangements, which were in the capable hands of John Keillor, assisted by Robert Carver and J. Fremont, went off in smooth order, which statement also holds for the ladies' entertainment, arrangements for which were directed by Mrs. John Keillor. Ladies' entertainment included a theatre party and sight-seeing expeditions in the vicinity of Vancouver. The scenic drive to Grouse Mountain Chalet on stages of the British Columbia Electric Railway Company was thoroughly enjoyed by all who made the trip, and the photograph above indicates the interest taken in the stag banquet Wednesday evening. Chas. H. Dickey acted as toastmaster at the banquet, and presided at business sessions.

Details of the business sessions of the conference were given in *Western Gas* for May, and much of the material submitted for the "Question and Answer" feature of the Vancouver meeting appeared in this publication last month.

GAS EXTENSIONS TO SERVE OAKLAND AIRPORT

To meet the development in and about the Oakland Airport, the Pacific Gas and Electric Company has approved orders for the extension of 9,200 feet of high pressure gas main on Jones Avenue and Airport Road, involving an expenditure of $7,863. According to L. H. Newbert, division manager of the company, gas will be used in the administration building, hangars, oakite tanks, restaurant, pumping station and for miscellaneous shop usage. In addition to the above, plans are completed and appropriations made for a weather bureau building and a passenger depot. These will use gas for heating.

PETROLEUM EXPOSITION AND CONGRESS WIDELY ENDORSED

Prospects for the next International Petroleum Exposition and Congress, which is scheduled to be held from October 20 to 29 at Tulsa, Okla., are brighter than ever before, in view of general action in the petroleum, gas, natural gasoline and related industries looking toward co-operation with those directing the Exposition. Resolutions favorable to the enterprise have been passed by the Natural Gas Department of the American Gas Association, while in convention at Dallas, and by the Natural Gasoline Association of America in its recent Tulsa convention; and national interest in the event is seen in recent resolutions passed in both houses of Congress with the object of issuing official invitations to other countries to participate.

This year space rates at the Exposition have been cut 25 per cent, which should be an important stimulus to comprehensive exhibits.

J. Burr Gibbons is general manager for the Exposition, which has temporary offices in the Bliss Building, Tulsa, Oklahoma.

SEPT. 17-20 DATES FOR SECOND FUELS MEET

Under the auspices of the Cleveland Section of the A. S. M. E. will be held the Second National Fuels Meeting, from September 17 to 20, at Cleveland. A number of papers of interest to gas engineers are included on the announced preliminary program.

EDITORIAL

What Is the Layman's Opinion of Utilities?

THE current issue of a nationally circulated journal turns in its editorial column to a passing comment upon the Federal Trade Commission hearings on the operations of public utility companies. While no attempt is made by the editorial writer to go profoundly into the problems, real or imagined, which centered the Commission's attention upon the utilities, his remarks probably may be taken as a fair generalization of what the layman—who knows the utilities rather from the viewpoint of a user of their services than as one skilled in the intricacies of their operation—thinks about political inquiries in the utility field.

Unprejudiced observers, says the editor, when they contemplate such inquiries are apt to "be on the lookout for a strong government or public-ownership advocacy lurking in the background". And he points out that the game of making political capital out of the utilities is not a new one.

Dismissing the thought of public-ownership in a word as "suicidal" the editor scoffs the idea that popular opinion would sanction such a step. "The history of group operations of utilities is one of increasing service to the public, accompanied in many cases by rate reductions." . . . "In plain language and in the vernacular, the so-called utilities are getting along fine".

Addressing the utilities the editor suggests that their best course, in the face of "investigations", is to continue on the even tenor of their ways, "concentrating on giving the best possible service at the lowest price". Satisfied customers, he feels with some reason, are much more to be trusted as agents against the vicious public-ownership germ than are over-zealous propaganda methods.

On this matter of public utility propaganda there is more to be said. Certainly an industry which looms so large in proportions and in the vital character of its services to the public should be known intimately by the public. The industry can hardly be blamed for wanting the manner of its introduction to be a sympathetic one, especially as efficient service is conditioned in so many respects by popular attitude toward the utility. Peculiar demands of the utility business, such as the high proportion of investment required, and the contrasting low ratio of turnover in its capital, should be known if the character of service rendered is to be appreciated. Consumers must constantly be invoked to use utility services intelligently. Future workers and new capital must constantly be attracted into the industry. No outside agency will take these steps for the utility. The industry must get its own story across, which is to say that there is a place, and an essential one, for "propaganda" in the every-day routine of performing its services and insuring its future.

And we have said nothing of the fact that utilities in all fairness should be granted the privilege of defending themselves against unfounded attack. Their use of the press and other avenues, employed alike by those who bring charges against utilities, can hardly be condemned.

New Wrinkles in Home Service

HOME service may be classified as a new science, although its subject matter is as old as the home. As a new science it is quickly developing its technique, made up of the methods and devices which are succeeding in the field.

At least two gas company home service departments have been doing some original thinking. The Pacific Gas and Electric Company, San Francisco, and the Laclede Gas Light Company, St. Louis, not content with merely drawing the housewife to company headquarters for demonstrations, have been taking portable kitchens to the housewife, as related on other pages of this issue. The Laclede company has also begun to reach into homes of its wealthy consumers through home service education of servants to the advantages of gas.

Another Milestone for Natural Gas

IN another section of this issue there is described the coming of natural gas to Denver, Colorado—bringing again to attention an instance in which the courageous investment of millions of dollars and the concentration of engineering knowledge have combined to transmit this natural resource over states' boundaries to points where it will aid in development of new wealth and the spreading of domestic comfort. A decade ago such a project would have staggered the imagination—now, in the light of gas transmission progress, it approaches the commonplace. But this does not minimize the initiative of those who have brought the enterprise to its consummation.

Using Fewer Distribution Dollars

by Following Modern Practices

By A. R. BAILEY
Foreman Gas Distribution
*Los Angeles Gas and Electric Corporation**

MODERN methods in any business have been developed primarily for the purpose of giving as good, or a better product for less cost. New methods should be carefully considered, not only from an engineering point of view but also from one of economics, as practices that are used very successfully in large industry may not be economically advisable for a smaller business of the same nature.

These same principles hold true for public utilities, and it is improbable that all the practices will be applicable to both large systems and those of moderate size; but there are many modern methods which can be successfully adapted to any system by making slight changes to meet local conditions.

Modern distribution methods must be such that they will allow the greatest possible return from the capital invested in new construction, the maximum in results from the money spent on maintenance and the highest in efficiency from the money put into the operating activities.

DISTRIBUTION DESIGN

Construction methods are of particular importance as every dollar needlessly spent is not only frozen capital, but collects its share of interest and depreciation as well as the active dollar. Since the greatest part of construction work in a distribution system is the installation of piping, it is here that modern methods can effect one of the greatest savings. Distribution designs must have careful attention, and the selection of main sizes should be made by mathematical calculation rather than selection by a guess based upon experience.

A load survey will determine on what basis this calculation should be made. Recording meters on existing houses will show that the ratio of the actual demand to the installed capacity is comparatively small, usually running about 30 per cent and seldom, if ever, exceeding 50 per cent. In addition to this factor for the individual consumer we have the knowledge that with a group of consumers, their demands are not at all coincident and this gives us diversity. The ratio of individual demand to installed capacity and also the diversity factor for a group of consumers will vary according to the class of residences, and the section of town. A few seasons work with recording meters will disclose just what these factors are, and once they are established we need have little fear of them changing. Changes are prevented by the fact that real estate prices and living costs limit people to neighborhoods within their financial reach. After working out the demands for the various classes of consumers the information can be easily set up in terms of cubic foot demand per lineal foot of main and then the length of any main will at once give the total load to be supplied. There is one more important factor in the calculating which we cannot afford to overlook. This is the fact that flow formulas usually show the rate of flow where the discharge is entirely at the end of the line. Such a condition does not exist on our distributor mains, but instead, we are taking some gas off the main at each service, which will give us a greater capacity than discharging entirely at the end. Actual experiments have shown that under conditions where gas is taken off at services along the main, the line capacity will be 1.64 more than with straight end discharge. After the facts are known the actual calculation is such a simple procedure that it can be worked out on a flow computor in a few minutes time.

OVERBUILDING THE SYSTEM

All this may seem like a lot of unnecessary effort, but a look at some of the older distribution systems will show main sizes entirely out of proportion to the load they are carrying. This will usually be the case where the size has been selected by a guess based on experience, as the tendency is ever present to make the selection larger than necessary as experience has taught a severe lesson when the selection was too small. This amount of money spent in overbuilding can be so easily saved by the modern method that to ignore it is a reflection on the business.

The physical work of main installations offers opportunities for the use of trenching and back-filling machinery which will effect a great saving in the cost of installation. The size of the system and the amount of construction to be done will dictate whether or not the purchase of this machinery is a good investment. When the total difference between the cost of manual labor and the cost of mechanical jobs would pay for the purchase of the machinery in two years time, then we should purchase the equipment. Below this amount the purchase of the machines would not be justified.

District governors are a part of most distribution systems and are usually installed in vaults in the street. Modern practice is to place these vaults under the sidewalk with the manhole opening into the space between the sidewalk and curbing rather than out in the roadway. This location has several advantages: there is less chance of surface water getting into the pit; the employee entering or leaving the manhole is not in the line of traffic; and, the cover can be made from steel checker plate instead of heavy casting, which not only reduces the construction costs but is much easier for workmen to handle.

WELDING PRACTICE

Acetylene welding has played an important part in main line construction for some time and recent developments have given it even greater possibilities. Where a main connection is to be made to an existing main the procedure has been to weld on a nipple and tap through a valve, providing the existing main was steel or wrought iron. Where cast iron was involved the practice was to cut a tee in the line, as attempts to braze on a steel nipple to a cast iron main had not been successful. Experimentation along this line developed the practice of thoroughly cleaning the main by sand blasting for several feet on each side of the spot to be brazed. This allowed a rapid heat transfer from the pipe to

(Continued on Page 44)

*Delivered before the Arizona Utilities Association, assembled in joint session with the Pacific Coast Gas Association, at Prescott, Arizona, April 27. 1928.

New Business *on* Existing Mains

By H. E. DAVIDSON

Superintendent Appliance Sales
*Southern California Gas Company**

THE advantages of building up the load on our present mains and thus increasing our revenue without a corresponding increase in capital invested are, of course, admitted by all; but by what means can we attain the desired end?

Increased load on existing mains may be secured by increasing the use of appliances already connected, through efforts of an educational nature; by replacing present appliances with more modern ones which through greater service to the consumer and consequent use will require more gas, as when an old style tank heater is replaced by an automatic type; or by installing appliances, such as gas refrigerators, which will create a demand for gas which did not exist before.

ANALYZING COMPETITION

Before we can successfully increase our load through any or all of these methods, we must carefully study our competition. By competition I mean not only the effort to maintain and increase our business against similar effort on the part of those selling competing sources of heat, such as wood, coal, oil or electricity, but also that more intense and powerful competition known as "indirect." Automobiles and motion pictures, by decreasing the time spent at home, diminish our revenue, while the vogue of canned foods, bakery and restaurant products, by lessening the amount of cooking done at home, reduces the gas bill correspondingly. Gas appliances must be sold not simply in competition with similar devices using other fuels, but in competition with radios, furniture and clothing. The struggle for the consumer's dollar is becoming more and more intense, and it is obvious that if we are to make progress, it must be by modern methods of selling, such as are used by our competitors.

With this in mind, let us consider each of the suggested methods of load building. The first is that of increasing the use of appliances already connected to our lines. This is essentially a matter of education, and can be accomplished by home service work, by cooking schools, by printed matter, by direct advertising, or by radio talks. No matter which one is used, the emphasis should be placed upon the pleasurable results obtained through the use of gas.

Home service departments are most effective agencies for the promotion of greater use of gas in the home. Home service workers, through intimate contact with those who use our fuel, help solve difficulties in its use, straighten out misunderstandings, and through the most effective means of education known, personal instruction, build up a greater use of gas.

H. E. Davidson

The cooking school, either operated independently or in conjunction with a home service department, is also an effective load builder. . Through group instruction it stimulates the interest in home cooking, and so tends to counteract the modern trend in the opposite direction.

Printed matter for distribution among consumers, and advertising copy which effectually tells the possibilities of gas in making life more comfortable cannot help but produce the desired result—greater gas consumption.

RADIO USE

Radio talks as a means of stimulating interest in home affairs, and particularly cooking, are comparatively new, but quite a few large companies, including the Consolidated of New York and the Peoples of Chicago, have found them really profitable. At present we are planning a broadcasting campaign to cover the entire Pacific Coast, and hope to be able to put it on the air next fall.

The second method of building up our load is by replacing present appliances with more modern ones. At first this may seem a rather doubtful one, as the more modern appliances are also more efficient, and require less gas to do the same work. Two other factors, however, oppose this tendency, and more than counteract it. In the first place, the greater satisfaction derived from using an efficient appliance tends to increase the usage as compared with the old one, just as the new family car, although running more miles on each gallon of gasoline, usually consumes more gallons per month than did the old one; and secondly, the new appliance is generally expected to and does render greater service than the old, in consideration of which a higher gas bill is expected. Undoubtedly the greatest possibility in this field lies in the replacement of the various old style water heaters with newer automatic storage types. Probably not over 20 per cent of our consumers have modern water heaters, which not only increase our gas load, but also give the owner the convenience of instant hot water at all times. A demand for the latter service, created by proper advertising, would place a large number of additional automatic heaters on our lines, with a corresponding increase in gas consumed.

The installation of modern gas ranges and space heaters in place of old ones which function so imperfectly that they are used less than they should be, would also be of direct benefit to us in gas sales as well as in bettering our public relations.

CREATING NEW DEMANDS

The third means of accomplishing the desired end of building up the load per meter is through the installation of appliances which will create new demands for gas. This may be done by installing a gas-fired furnace or floor furnace in a building which has previously been heated by another fuel, by replacing competitive ranges, space heaters and water heaters, or by placing gas-fired incinerators and refrigerators on our lines. Gas-fired refrigeration has tremendous possibilities, for it is a 24 hour a day load, with its heaviest demand in summer. All of the gas machines are of the absorption type, and are not only economical to operate, but are also free from noise and vibration. Gas refrigeration should be vigorously promoted by all gas companies, not only on account of its load building character but also because of its great advertising value to the industry.

In advertising or selling gas appliances we should always emphasize the results which may be obtained from an appliance, rather than the details of the appliance itself. We should stress what wonderful foods can be prepared on the gas range, or how its oven heat regulator will lessen the labor of cooking; how the automatic water heater makes housework easier, living more enjoyable, and aids in the culture of beauty; how gas heating equipment makes the home cheerful and comfortable in the coldest weather, without work—and so with the other appliances. Probably all of us

(Continued on Page 57)

*Delivered before the Arizona Utilities Association, Prescott, Ariz., April 27, 1928.

Gas Heating *in* Industry and *in the* Home

By F. C. HOFFMAN
Sales Manager, Northern States Power Company
St. Paul, Minnesota

IN ST. PAUL, Minnesota, there are gas men who have energetically gone after the industrial and househeating loads for a manufactured gas utility. Judging from the present article, they are optimistic for the growth of this load, as well they may be on the basis of results achieved.

Mr. Hoffman, who gave this paper before the Byllesby Engineering and Management Corporation's first Sales and Advertising Conference, held early this year, has developed a technique as well as a philosophy for selling artificial gas to industrial and househeating users.

His remarks on househeating, in the latter portion of his paper, should not be lost because they come at this season of the year. Summer selling of gas for househeating should go hand in hand with building construction and repair, which are at their height during the present months—EDITOR.

WITH the passing of the gas light and the entry of the electric light about twenty-five years ago, pessimists foresaw the doom of the gas industry. In 1902 the manufactured gas sold in the United States totatled 92,714,000,000 cubic feet—the largest part of which was being used for lighting purposes. The gas range was in its infancy and the water heater still in the embryo stage. Last year the total gas sales of manufactured gas amounted to 475 billion cubic feet, an increase of 352 per cent during a period that showed a 50 per cent increase in population. Let us assume an annual consumption of 30,000 cubic feet for the 11 million domestic consumers and we have a total of 330 billion, which leaves a total of 145 billion cubic feet for other purposes and these other purposes are what we today term "commercial," "industrial," and "house heating."

AN AMAZING COMEBACK

Suppose we consider the total sales for lighting for 1927 to have been 97 billion cubic feet—but during the last 25 years we have lost all lighting to our aggressive competitor—in spite of that, the industry can still point to the recovery of that amount and 50 per cent more, while in addition it built up a domestic business of 330 billion cubic feet. Quite a comeback indeed for a 100 year old industry that was considered on its way to the hazy past!

And what contributed most to this comeback? The ralization that the industry had a commodity that could serve the public better than that which the public was using. The realization that gas, then coming into use for cooking, was a heat application—and why not sell it for all purposes where heat is necessary. The industry sold itself thoroughly on the value of its commodity to the public, then buckled down to conscientious hard work. The 145 billion cubic feet of sales last year is the result.

While the fundamentals of salesmanship are the same in all lines, there is a different application of methods necessary in selling large quantities of gas, for the reason that processes are varied where large quantities are used. The salesmen and the methods of procedure that can be used to sell domestic ranges and water heaters are totally inapplicable to the larger field. The application of gas to process work is a technical proposition and resolves itself down to cold facts—production and cost—with a possibility of cleanliness and dependability, where these can show financial returns.

From time to time we hear the warning signal to look out when taking on volume business; it may have a serious effect on our distribution system, or it may force additional plant capacity. For the purpose of this discussion I am assuming that it is perfectly proper to sell all we can at the proper rate—and, of course, with foreknowledge of plant and distribution conditions before commitments are made.

This is an age of big business, of quantity production, and it has been demonstrated that quantity production reduces unit costs. While it is true that in the gas and electric business the necessity for capacity to meet instant demand is a vital factor and is often forced by the rapid addition of large customers, thus adding to the capital investment, yet it would still appear to be good business to sell the commodity anywhere for any purpose if the company is properly compensated.

SURVEY IS FIRST STEP

Of first importance in the sale of gas in large quantities is a survey of the locality as to the kinds of industries in the community served and whether heat is applied in their processes. The gas association can furnish information as to the types of operation where gas can be used. Every industry should be listed, the nature of its various operations noted, also the kind and quantity of fuel, the cost and the quantity of production. Every open-minded business man is interested in anything that will save him money; at least, he is willing to let you show him your picture, and where there is no cost to him involved the entry is less difficult. It is always best to get in touch with the key man in the shop so as not to leave any suspicions in his mind as to just what you are trying to do. The greatest fear the worker has is loss of his job, and if it is thought that that is to be the ultimate outcome of your work, the task of obtaining information will be very much harder.

Illustrative of the necessity of careful combing of industry for possible heat applications is our own experience. At the outset of our industrial gas development work it was thought that prospects were few, as our community was more of a jobbing than manufacturing center. Our list of approximately 900 industrial and commercial customers shows the following: 503 hotels, restaurants and eating places; 78 machine shops, foundries, container manufacturers; 54 printers and engravers; 48 manufacturers of food products; 37 laundries and dry cleaners; 61 hat, shoe and clothing manufacturers; 97 bakers and confectioners; 22 miscellaneous industries.

Too often in the making of surveys the company representatives in their eagerness to find big things, overlook the small ones. The present industrial business of the company was built up on small installations. In many of the largest plants now using gas, the smallest process was the first converted to show that gas really would do what was claimed for it.

The survey cards having been analyzed, it is necessary to establish a rate which must not only be profitable to the company but one that will get the business. We are dealing with a competitive fuel industry, while in domestic use this factor is negligible.

SELECTING THE PERSONNEL

After the rate has been decided upon and the management convinced that this additional business will prove profitable, the personnel must be selected for this special selling job. In large properties this is a comparatively easy problem. They have the men and the resources to educate. In the smaller properties the industrial gas development usually

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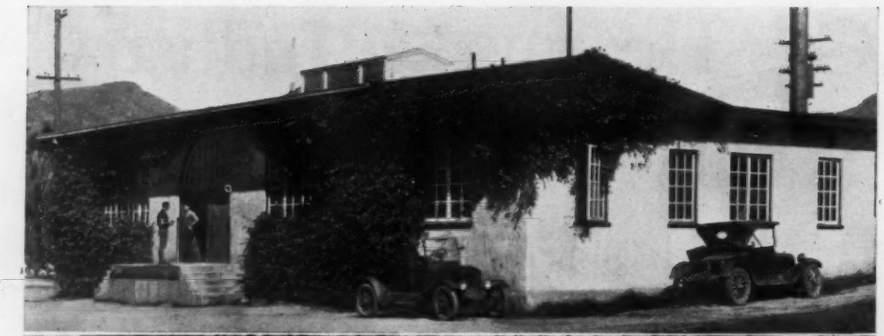
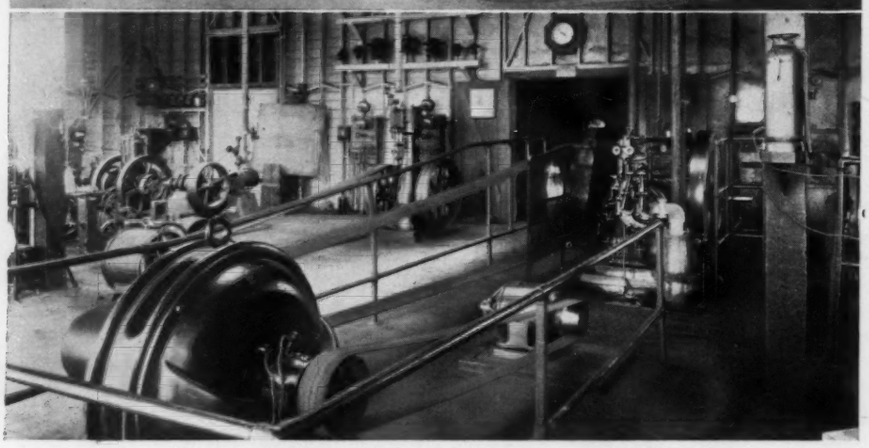




A Constant Gas Engine

By ALLEN T. FESLER
General Superintendent, Santa Maria Gas Company
Santa Maria, California

THE State of California may take pride in the growing importance of the State Polytechnic School at San Luis Obispo, with an enrollment of over 375 boys and girls who are being educated along the usual lines of culture and in addition thereto the practical and useful producing side, including agriculture and engineering, and all branches of domestic science for the girls. Both boys and girls are taught to do the things with their heads and hands fitting them immediately for the useful walks of life.

The State has made a recent appropriation of $185,000 for additional buildings, and under the management of President B. R. Crandall and his able corps of assistants, the school is filling a large sphere of usefulness to the entire State of California.

One of the accompanying views shows the power house of the school, located at the northern city limits of the city of San Luis Obispo. Since 1916 the Sterling boilers in this plant have been supplied with natural gas, transported 40 miles from the Santa Maria oil fields, by the Santa Maria Gas Company. The lower photograph shows the engine room, in which is housed a 50 H. P. International, Type 2 cylinders opposed, gas engine, belt connected to a 37½ K. W. generator, which will be noticed, is in turn belted to a smaller generator. While this arrangement may not promote the highest efficiency in the use of power, it is an instance of State economy in using available equipment.

This International Gas Engine was on exhibition at the Pan-American Exposition in San Francisco, in 1915. In 1916 it was installed and drives the generator on which the entire school, including shops and buildings, is lighted with electricity, as well as pumping the water supplying the school. With the exception of small intervals, this engine has operated continuously approximately 14 hours a day for nearly 13 years. Shutdowns and interruption of service have been practically unknown and the engine continues in good operating condition, with practically no costs whatever for repairs or replacements.

This is another example of economy and efficiency that may be effected through the use of the old faithful gas engine.

JOHN C. DIEHL VISITS WEST

John C. Diehl of the Metric Metal Works, Erie, Penn., and editor of "Natural Gas Handbook," was on the Pacific Coast in June, visiting gas companies from Canada south.

A. P. I. DATES

December 4, 5, and 6 have been fixed by the American Petroleum Institute board of directors as dates for the ninth annual meeting of that organization, to be held this year at the Stevens Hotel, Chicago.

NEW COMPANY FORMED FOR GAS TRANSMISSION

The Black Hills Utility Company has been formed by the Montana-Dakota Power Company to bring natural gas from the field at Baker in eastern Montana to the Black Hills. Construction is under way on the main lines and Belle-Fourche, northernmost community of the Black Hills region, is expected to have gas by Aug. 1. This section has heretofore not been supplied with gas service of any kind.

START ON CITIES SERVICE LINE TO OTTAWA

A contract has been let for construction of the 132-mile extension of the Cities Service Gas Company's 20-inch natural gas pipe line from Wichita to Ottawa, Kansas. Work will begin immediately, and the contract calls for completion within 86 calendar days from the arrival of the first carload of pipe. This line is the northern end of the project completed about January 1, extending from Pampa, Texas, to Wichita. The extension will link the Kansas City area with the famous 6666 ranch in the Texas panhandle, center of hundreds of thousands of acres of gas reserves owned and controlled by the Empire and affiliated companies.

The line will be a combination coupled and welded project, similar to the construction between Wichita and Pampa. Between Wichita and Ottawa the line will pass through or on the outskirts of both El Dorado and Emporia.

To start the construction, The Oklahoma Construction company will throw three main line crews and one river crossing crew into the field at once, adding other crews as the work progresses. The line is expected to be completed early in September.

FRANCHISE ACTIVITY STILL ON IN OKLAHOMA

A number of Oklahoma towns have voted natural gas franchises recently. Wanette, June 11, with but one dissenting vote, granted a gas franchise to the Seminole Oil and Gas Company. A few days before, Asher voted a gas franchise to the same company. Snyder and Mountain Park granted a gas franchise to R. N. Mitchell and Vester Smith of McLean, Texas. By a unanimous vote Tyrone granted a gas franchise to the Texas County Gas Company.

NEWSPAPERMEN GUESTS OF SOUTHERN COUNTIES

Four delegations of newspaper men, representing more than 20 daily papers and 40 weeklies were taken over the Ventura, Calif., oil fields during June as guests of the Southern Counties Gas Company, which derives part of its gas supply from this source. The company's compressor station and transmission facilities were viewed by the visiting press representatives.

NAME GENERAL COMMITTEE ON 10TH A. G. A. CONVENTION

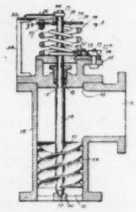
With its tenth annual convention dated for October 8 to 12, headquarters to be the Million Dollar Pier at Atlantic City, New Jersey, the American Gas Association is making plans for what is expected to prove the outstanding convention to date.

On the general program committee for the tenth convention are numbered the following, appointed recently by president Fogg of the A. G. A.: Chairman, Percy S. Young, Newark, N. J.; A. S. Hall, Springfield, Mass.; Geo. P. Hawley, Bridgeport, Conn.; Clifford Johnstone, San Francisco, Calif.; E. F. McKay, Oklahoma City, Okla.; N. C. McGowen, Shreveport, La.; Ord Preston, Washington, D. C.; E. H. Rosenquest, Mount Vernon, N. Y.; H. R. Sterrett, Des Moines, Ia.; D. R. Street, Ottawa, Ont.; Mrs. M. P. Wardman, Brooklyn, N. Y.; K. R. Boyes, A. G. A. Headquarters; H. W. Hartman, A. G. A. Headquarters.

The exhibition prospectus has already been mailed to manufacturers, and due to the fact that this year an appeal will be made to the attention of both natural and manufactured branches of the industry the exhibit is expected to take on larger proportions than ever before.

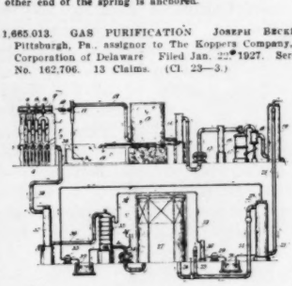
THIS MONTH'S PATENTS PERTAINING TO THE INDUSTRY

1,665,141. FLOW METER. CHARLES PETER MATER, Elizabeth, N. J. Filed Feb. 9, 1927. Serial No. 166,994. 5 Claims. (Cl. 73—167.)



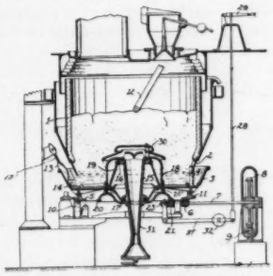
2. A casing having a passageway therein through which a fluid is adapted to flow and means for measuring the rate of such flow, including a shaft extending longitudinally of the passage, an impelled member on the shaft actedupon by the flowing fluid to turn the shaft, spring means opposing the turning movement of the shaft, a scale member, a cooperating indicating member carried by the shaft, the spring means including a spiral torsional spring, anchored at one end to the shaft, and a rotatably adjustable spring tensioning plate to which the other end of the spring is anchored.

1,665,013. GAS PURIFICATION. JOSEPH BECKER, Pittsburgh, Pa., assignor to The Koppers Company, a Corporation of Delaware. Filed Jan. 22, 1927. Serial No. 162,706. 13 Claims. (Cl. 23—3.)



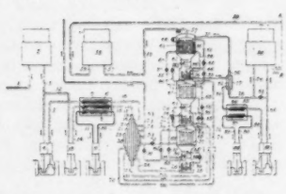
2. The process of gas purification which comprises transferring impurities from the gas to a liquid, and subsequently transferring said impurities from said liquid to a portion of the purified gas.

1,666,604. GAS PRODUCER. CHARLES W. LUMMIS, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a Corporation of Massachusetts. Filed Dec. 19, 1921. Serial No. 523,383. 6 Claims. (Cl. 48—85.1.)



5. In a gas producer, a shell and a water-seal pan connected together and for rotation in unison, means for supporting said shell from said pan, an independently revoluble ash plow supported on the bottom of said pan, a rotatable member to which said plow is secured, said member making a seal with water in said pan, and means for imparting a rotation to said member independently of and at a speed different from the rotation imparted to pan and shell.

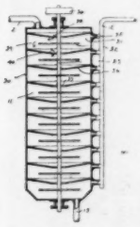
1,664,412. PRODUCTION OF HELIUM FROM NATURAL GAS. PIERRE E. HAYNES, Buffalo, N. Y., assignor to The Linde Air Products Company, a Corporation of Ohio. Filed Aug. 7, 1919. Serial No. 315,938. 6 Claims. (Cl. 183—115.)



1. In a process of obtaining helium from natural gas, compressing and cooling the gas, expanding the cooled compressed gas and thereby liquefying a substantial portion thereof, consisting principally of hydrocarbons; rectifying said liquefied portion to recover helium therefrom, and adding this helium to the residual expanded gas; subjecting the residual expanded gas to successively lower temperatures to condense its constituents other than helium in the order of their liquefying temperatures at the pressure to which they were expanded, collecting the liquids separately, and utilizing said liquids separately in cooling the gas to the said successively lower temperatures; whereby helium in gaseous form is concentrated as a final residue; and conducting off and collecting such final residue.

1,667,139. GAS SEPARATOR. JOHN F. BORDEN, Alameda, Calif., assignor to Oliver Continuous Filter Company, Oakland, Calif., a Corporation of California. Filed Mar. 20, 1924. Serial No. 700,494. 1 Claim. (Cl. 183—3.)

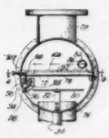
Apparatus of the character described comprising a vertically arranged cylinder with means at its upper end for controlling the admission of fluid thereto, a series of spaced shelf partitions within the cylinder each slanted downwardly and with an opening through the lowest portion, a spreader disk positioned between each pair of shelves adapted to spread material passing through the opening of one shelf to the outer portion of the next shelf,



means for rotating the spreader disks, and means for applying a suction just below the highest portion of each shelf.

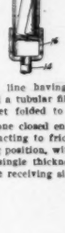
1,666,744. GAS-ABSORPTION APPARATUS. WILBUR G. LAIRD, New York, N. Y., assignor to Henry L. Doherty, New York, N. Y. Original application filed June 24, 1919, Serial No. 306,391. Divided and this application filed Nov. 3, 1920. Serial No. 421,442. 6 Claims. (Cl. 261—115.)

1. An apparatus for absorbing gas under pressure in liquids which comprises a horizontal cylindrical container, a perforated substantially horizontal partition in said cylindrical container, means for uniformly feeding liquid at one edge of said partition, means for uniformly removing the liquid from the other edge of the partition, means for introducing gas under the partition and re-



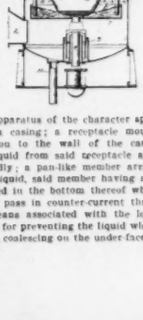
moving gas from above the partition and dams at right angles to the axis of the container dividing the surface of the partition into sections.

1,669,461. GAS FILTER. CHARLES B. GAMBLE, Minneapolis, Minn. Filed Aug. 24, 1925. Serial No. 52,150. 2 Claims. (Cl. 183—44.)



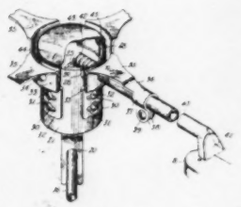
1. In a gas pipe line having a sectional expansion chamber therein, and a tubular filter member therein comprising a paper sheet folded to provide a substantially cylindrical passage, one closed end, and a series of radial over-lapping wherin acting to frictionally sealingly secure the device in filtering position, with the closed end providing substantially a single thickness of the material and being disposed on the receiving side.

1,669,795. LIQUID AND GAS CONTACT APPARATUS. FREDERICK H. WAGNER, Baltimore, Md., assignor to The Bartlett Hayward Company, Baltimore, Md., a Corporation of Maryland. Filed June 17, 1925. Serial No. 37,795. 7 Claims. (Cl. 261—91.)



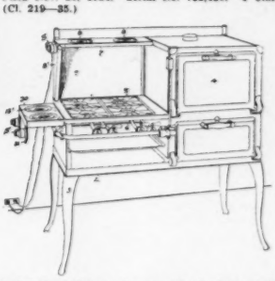
1. In an apparatus of the character specified, the combination of a casing; a receptacle mounted therein in spaced relation to the wall of the casing; means for drawing a liquid from said receptacle and spraying the same outwardly; a pan-like member arranged to receive the sprayed liquid, said member having a series of perforations formed in the bottom thereof whereby the liquid and gas may pass in counter-current through said openings; and means associated with the lower portions of said openings for preventing the liquid which passes therethrough from coalescing on the under-face of said pan-like member.

1,664,917. SAFETY IGNITER FOR GAS STOVES. WILLIAM F. DEXTER, Newark, N. J., assignor to U. S. Tool Co., Inc., East Orange, N. J., a Corporation of New Jersey. Filed Nov. 10, 1925. Serial No. 68,072. 2 Claims. (Cl. 158—115.)



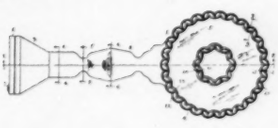
1. The combination with a gas burner, a pilot tip and a gas supply source, of a pipe connecting said supply source with said tip, a control valve in said pipe, a housing completely enclosing said tip, a cap loosely engageable over said housing having an intervening air space, a bracket adjustably engaged on said housing, a tube adjustable in said bracket to extend horizontally through the wall of said housing into the path of flame from said tip, said tube having a series of weakening grooves whereby shortening is facilitated, and means on the outer end of said tube adapted to collect gas from said burner and deliver to said tip.

1,667,521. COMBINED GAS AND ELECTRIC COOK-STOVE OR RANGE. FRED C. ALBER, Cleveland, Ohio. Filed Nov. 26, 1924. Serial No. 752,430. 4 Claims. (Cl. 219—35.)



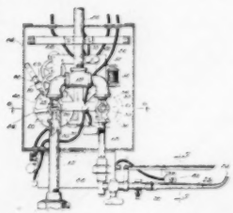
1. A cook shelf for a stove or range having a cooking top, containing a gas burner, said shelf being mounted upon a rear wall of said range and having electric heaters therein, and an electric switch for said heaters mounted at one end of said shelf and offside of said cooking top.

1,663,339. GAS BURNER. BERNARD A. GEUBINK and LOUIS H. GEUBINE, East Cleveland, Ohio. Filed July 13, 1923. Serial No. 651,237. 2 Claims. (Cl. 158—116.)



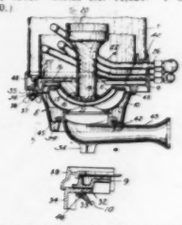
1. A gas burner comprising a tubular gas passageway, a valved intake member at one end thereof and a jet member at the opposite end thereof, said jet member being angularly disposed with respect to said tubular gas passageway, an inner and outer series of lenticular orifices formed in said jet member, each alternate orifice being angularly disposed with respect to its immediately adjacent orifices.

1,665,088. AUTOMATIC LIGHTER FOR GAS WATER HEATERS. HARVEY A. L. FOWLER, Valley Stream, N. Y. Filed June 24, 1927. Serial No. 201,254. 6 Claims. (Cl. 158—115.)



6. In a lighter for gas appliances, a gas control valve having a rotatable plug, a shaft extending from said plug, a disk mounted on said shaft and having notches in its peripheral edge, a movable member seated in one of said notches, an electric motor operatively connected to said shaft by a gear train, said motor being arranged in an electric circuit with a source of electric energy, a motor control switch normally open and disposed in the path of movement of said movable member, and manually operated means for lifting said member out of its engaging notch to actuate said switch to close said motor circuit whereby said motor will impart rotation to said plug to move the same to open and closed position, said member automatically dropping into the next notch in said disk during partial rotation thereof to disengage said switch, an electric spark device, a switch arm mounted on said shaft, a contact disposed in the path of rotation of said contact, said switch arm, contact and spark device being arranged in an electric circuit with a source of electric energy, whereby said arm may engage said contact to close said circuit to actuate said spark device during rotation of said shaft.

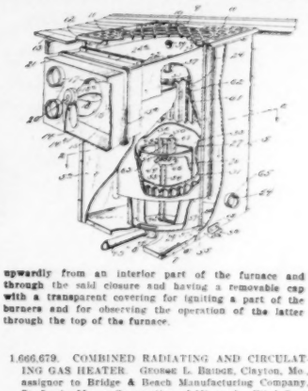
1,666,093. WATER-HEATER BASE. ROBERT C. HOYT, Oakland, Calif., assignor to Hoyt Heater Company, Los Angeles, Calif., a Corporation of California. Filed Nov. 23, 1925. Serial No. 70,827. 7 Claims. (Cl. 122—250.)



1. A water heater base adapted to support therein the burner for the heater, said base comprising an upper and a lower element; legs for supporting the heater provided with lateral dovetail extensions shaped to be driven into corresponding dovetail grooves provided in the underside of the upper element; and sealing means between the elements for additionally securing the legs to the upper element and for joining the elements so that products of combustion can not escape from the sides of the base, the said sealing means seated in a circumferential groove provided between the elements including the driven legs.

1,667,625. GAS FLOOR FURNACE. HARRY E. DICKINSON, Houston, Tex. Filed Dec. 29, 1926. Serial No. 157,782. 10 Claims. (Cl. 126—116.)

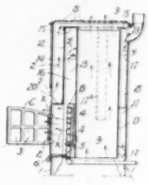
1. A gas floor furnace of the class specified, having enclosing means and an inner vent chamber with burners therein including a pilot light and combustion and heating chambers surrounding the said burner chamber, the lower part of the furnace having means for supplying air to and carrying off the products of combustion therefrom and also means for admitting cold air, an upper supplemental casing with a top closure plate and an outer distributing chamber with which the burners and combustion and heating chambers cooperate as heating means, a register over the top of the closure plate having removable members, and a tube extending



upwardly from an interior part of the furnace and through the said closure and having a removable cap with a transparent covering for igniting a part of the burners and for observing the operation of the latter through the top of the furnace.

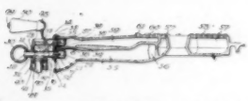
1,666,679. COMBINED RADIATING AND CIRCULATING GAS HEATER. GEORGE L. BAUGH, Clayton, Mo., assignor to Bridge & Beach Manufacturing Company, St. Louis, Mo., a Corporation of Missouri. Filed Sept. 30, 1927. Serial No. 223,033. 3 Claims. (Cl. 126—92.)

1. A combined radiating and air circulating gas heater, comprising a casing provided in its top with air discharge openings, a gas operated heating unit arranged inside of said casing, an opening in the front wall of said casing through which radiant heat can escape, an open-ended air flue member of relatively great cross sectional area arranged vertically in said casing in spaced relation to the side and rear walls of the casing so as to form

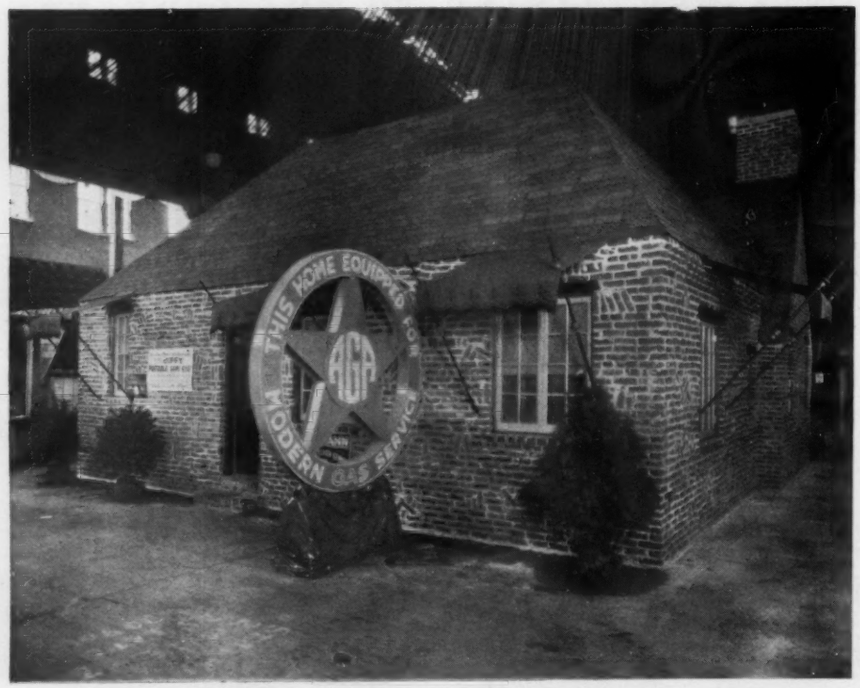


a rear gas flue and side gas flues, a partition interposed between said air flue member and the front wall of the casing so as to form an auxiliary air flue and a front gas flue, and air inlets in the front wall of the casing for supplying air to said auxiliary air flue.

1,664,509. GAS RANGE BURNER. PHILIP S. HARPER, Chicago, Ill. Filed May 20, 1927. Serial No. 192,852. 5 Claims. (Cl. 158—104.)



1. A double gas range burner with a gas cock having a single lever handle and having two gas nozzles, said nozzles projecting through an air shutter common to two mixing tubes into which said nozzles respectively discharge, one to each tube, each of said tubes leading to a burner section having a plurality of burner ports in the upper side thereof, one section having over twice the number of ports as the other section, said air shutter having an adjustable closing means intercepting air openings to both of said mixing tubes, the air opening to one tube being over twice the air opening to the other tube.



Five-room home erected by the Laclede Gas Light Company of St. Louis, at the Building Materials Show in the St. Louis Coliseum

Blue Star Group Has Aggressive Program

By R. D. Lewis

Director of Public Relations, The Laclede Gas Light Company
St. Louis, Missouri

An organization of representatives of gas companies was formed recently to sell the Blue Star plan to a metropolitan trade territory in the middle west, known as the 49th State. The 49th State has been so named by a large newspaper and comprises the trade territory surrounding St. Louis, Mo., taking in parts of Missouri, Illinois, Kentucky, Tennessee and Arkansas.

The officers of the Blue Star Group of the 49th State are W. L. Jones, commercial manager of the St. Louis County Gas Company, Webster Groves, chairman; W. D. Matlack, commercial manager of the Illinois Power & Light Company of East St. Louis, vice-chairman, and J. J. Burns, commercial manager of The Laclede Gas Light Company of St. Louis, secretary.

In an effort to create a background for the Blue Star home, all the gas companies in the 49th State made a survey of the residences heated by gas in order to establish a standard for the Blue Star home in this district. The group then established a minimum of requirements for a Blue Star home, and the Blue Star conformity certificate, which is as follows: Automatically controlled, A. G. A. approved central househeating plant; approved automatic water heaters, approved kitchen range and one of the following appliances: laundry dryer, ironer, washer, auxiliary space heater or standard laundry stove.

It is proposed to use every available medium to put the Blue Star idea across, including newspaper advertising, trade publications, bill flyers, store window displays and outdoor display advertising. An effort is being made to interest architects and builders in erecting model Blue Star homes. It is proposed to aid in constructing these homes on a co-operative basis by interesting the building material dealers in the plan.

The most successful attempt in this line has been the construction of an actual size home of five rooms and basement at the Building Materials Show at the Coliseum. Through the co-operative efforts of The Laclede Gas Light Company of St. Louis this home was completely gas equipped with gas refrigeration, cabinet gas range, househeating unit, auxiliary heating unit, laundry stove, ironer, washer and laundry dryer. A large electric sign in the form of a Blue Star seal of the American Gas Association Testing Laboratory hung in front of the home, announcing that it was completely equipped with gas burning appliances.

The Blue Star group of the 49th State is making efforts to acquaint all employees of gas companies with the Blue Star plan, by sending out letters explaining the idea.

Approximately 200 Blue Star conformity certificates have been issued in St. Louis and an effort is now being made to bring some of those who have househeating units, but lack other appliances, under the requirements. The organization plans later to extend membership to all manufacturers and representatives, hardware dealers and other agencies handling Blue Star appliances in the 49th State area.

TYRONE FRANCHISE

The Texas County Gas Company on May 30th was granted a gas franchise in Tyrone, Oklahoma.

OPERATE EAST IDAHO COMPANY

J. A. Coy and Maurice Hackett are now operating the plant of the East Idaho Gas Company, Idaho Falls, on a lease from the receiver of the utility, and the new operator's plan to continue under the present management, according to recent report.

B. C. ELECTRIC RAILWAY CO. CHANGES HANDS

The British Columbia Electric Railway Company, which also controls the Vancouver Gas Company, the Victoria Gas Company and the B. C. Electric Light Power & Gas Company, as well as numerous other subsidiary hydro-electric development organizations, has been sold for $57,665,000 to a joint group composed of Lord Rothermere, Sir Herbert Holt and J. H. Gundy of the Canada Power Corporation and Andrew Holt and Company, on the one hand, and Nesbitt Thompson and Company Ltd., and the Power Corporation of Canada on the other. Par value of the preferred stock of the company is $7,200,000 and the ordinary stock $12,035,000 giving a total par value of $19,235,000.

George Kidd, president of the B. C. Electric, has been made president of the British Columbia Power Corporation, now controlling the British Columbia Electric Railway and its subsidiaries. Past policies and management of the B. C. Electric Railway will be continued, according to Mr. Kidd. Local representation on the Board of the British Columbia Power Corp. includes W. G. Murrin, who was appointed a vice-president. Mr. Goward will occupy a similar position in Victoria, and Sir Frank Barnard, described as the father of the old B. C. Electric Railway Company also accepted a position on the directorate, together with Blake Wilson.

EQUIPMENT ADDED AT REDDING

The Pacific Gas and Electric Company has approved orders for added equipment in the Redding, Calif., gas plant, involving the installation of new purifiers, filterers, three circulating pumps and other equipment. This division will within a short time also begin work on the replacement of several hundred feet of wooden flume on South Battle Creek. This flume will be replaced with modern steel flume. The improvement call for an expenditure of $17,795.

METERMEN OF SOUTHERN CO.'S GAS CO. FORM GROUP

District meter men and head office representatives of the Southern Counties Gas Company, Los Angeles, held an organization meeting and banquet at the Bull Pen Inn, Los Angeles, on Thursday evening, June 7, to form a company employee group of those interested in gas measurement. Meetings will be held on the second Thursday of every second month. Committees on papers and on entertainment were appointed at the June 7 gathering, which was called by J. R. McLaughlin, meter engineer for the Southern Counties.

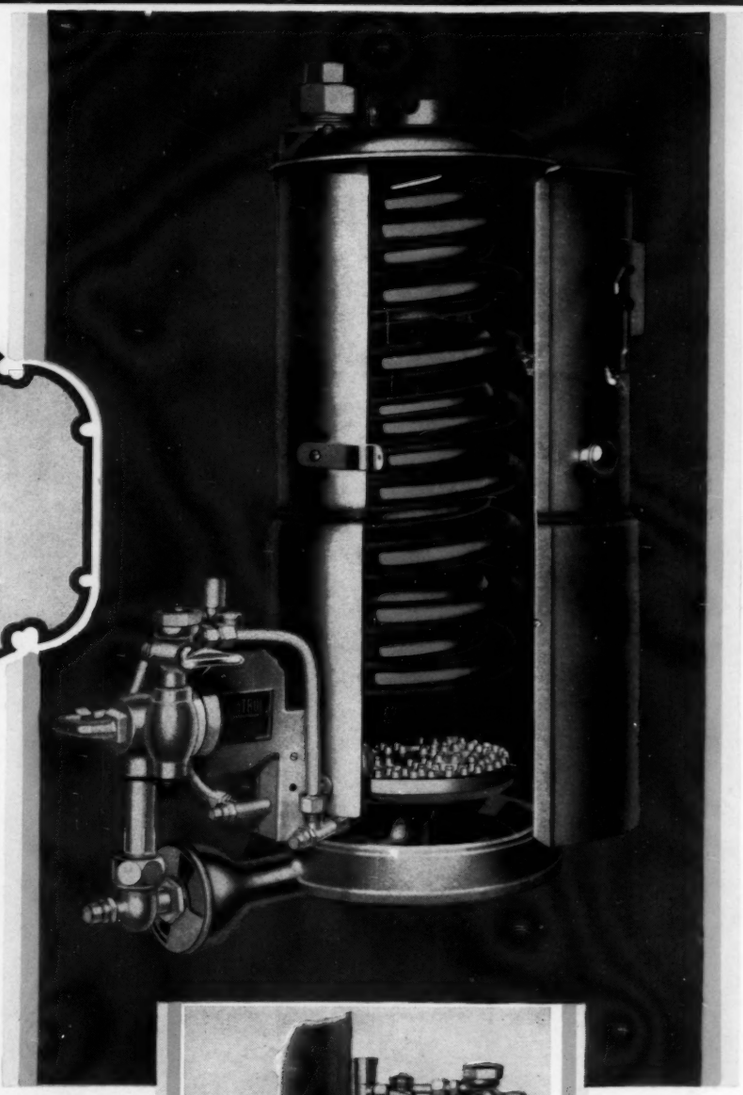
UTAH GAS AND COKE TO TAKE OVER OGDEN PROPERTY

Utah Gas and Coke Company, Salt Lake City, Utah, will assume control of the Ogden, Utah, gas properties, formerly owned by the Utah Light and Power Company, on July 1st, according to press reports released in June. Possibility of shutting down the Ogden Gas works and supplying gas from the Salt Lake plant through mains to be laid for that purpose, was suggested in the reports.

The purchase of the properties, which included 31 miles of gas mains in Salt Lake City, owned by the Utah Light & Power, was effected through the Mississippi Valley Utilities Investment Company, an Insull subsidiary, of which the Utah Gas & Coke Company is a unit. E. A. Angley is vice-president and general manager of the Salt Lake utility.

NOW • ANOTHER NEW ACHIEVEMENT

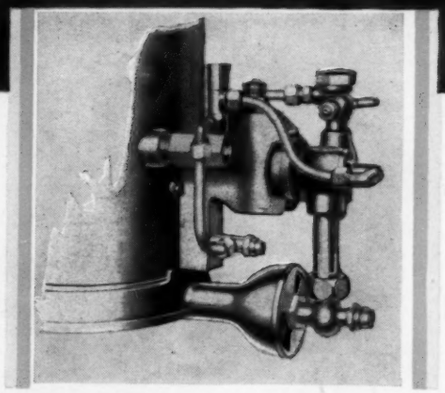
REX PATROL TANK HEATER



WITH distinct pride and satisfaction we announce the introduction of the New Rex-Patrol Tank Heater—a new water heater that is a real tribute to the ideals, traditions and accomplishments of The Cleveland Heater Co.

This new Rex-Patrol Water Heater is revolutionary as well as evolutionary in principle. It is an automatic or self-action tank water heater that may be attached to any range boiler. Thermostatic control and gas safety pilot are a part of the water heater—there are no accessories required to make this water heater entirely automatic.

The Rex-Patrol Tank Heater, of course, is approved by the Testing Laboratory of the American Gas Association and carries the Blue Star Seal.



Patent Pending.

Last but not least, Rex-Patrol Tank Heaters sell at the price within reach of everyone. Nor is that all—let us send you the *whole* story.

THE CLEVELAND HEATER CO.
1900 W. 112th St. Cleveland, Ohio

© The Cleveland Heater Co.

REVOLUTIONARY *and* SIMPLIFIED

The "Spee-Dee" Boiler

Trade Mark Registered
Patent Pending.

SCIENTIFIC research was carried on for years in the laboratory of The Cleveland Heater Co. All efforts have been focused upon an attempt to reduce the cost of water heating. The result is the new Spee-Dee Boiler—the simplest and most economical range boiler that may be used as a hot water storage tank in conjunction with a Rex Water Heater.

With a Spee-Dee Boiler you can sell all your customers who want economical hot water service, but haven't felt they could afford to pay fancy gas bills. Also the hundreds of fairly wealthy families who will welcome the opportunity to get hot water service at reasonable monthly cost.

We want you to know more about Spee-Dee Boilers, how they reduce water heating cost, their principles of operation, and how they can help you increase your business.

Write for further particulars.

THE CLEVELAND HEATER Co.
1900 W. 112th St. Cleveland, Ohio

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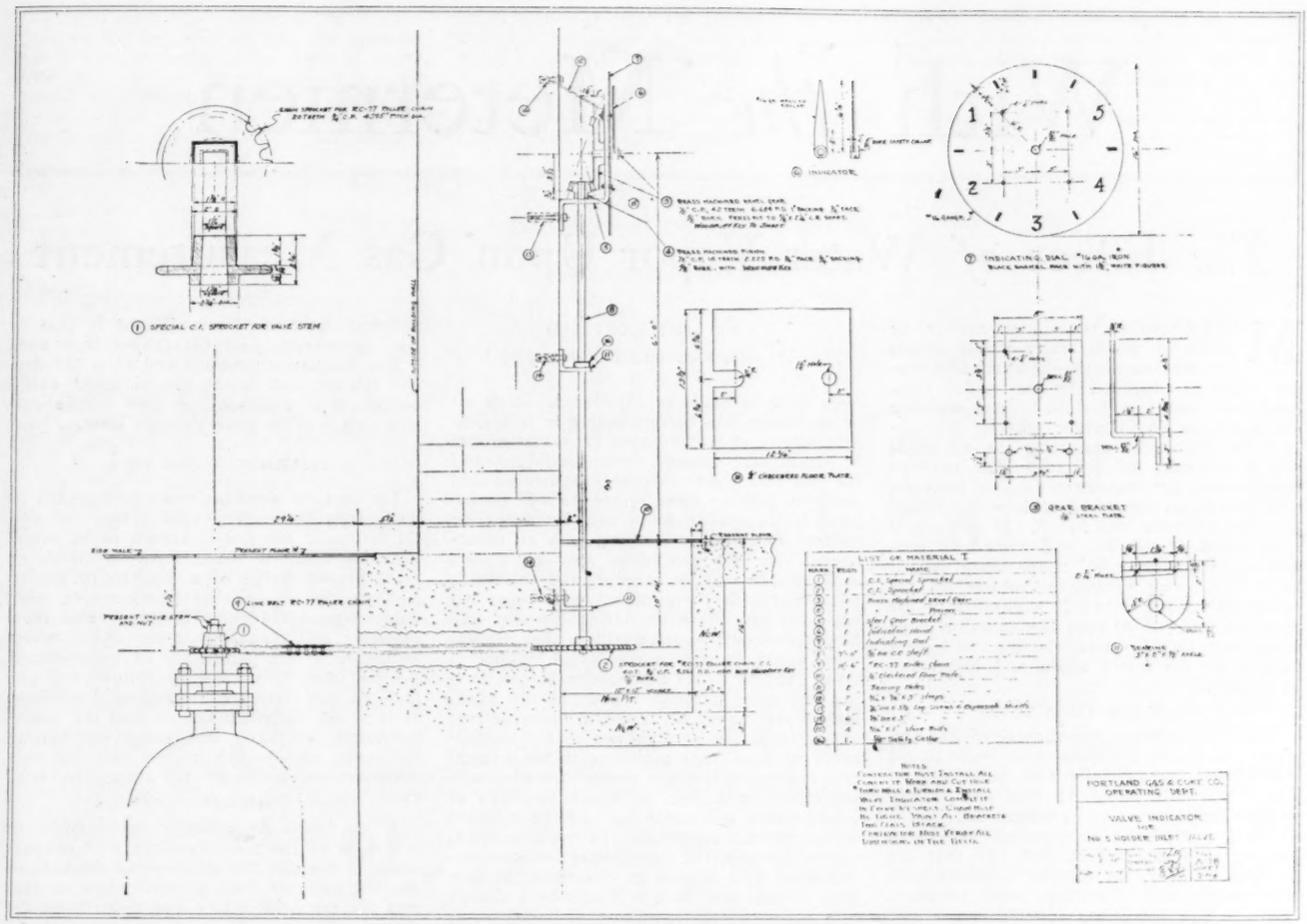


Indicating Dial *for* Holder Inlet Control Is Subject *of* "Wrinkle"

N. H. WARDALE, assistant superintendent of production for the Portland Gas & Coke Company, is the author of the following "wrinkle" published by *Western Gas* through arrangement with its originator and the Secretary of the Pacific Coast Gas Association, for which organization's members it was originally intended. We give the "wrinkle" in Mr. Wardale's own words:

"One of our holder inlet valves is located under a sidewalk and is controlled with a removable key by a man located in the adjacent building. Instructions for changing valve setting are given him by phone and we had difficulty in at all times having a visible indication of the number of turns the valve was open.

"The print (diagram above) shows an arrangement for an indicating dial inside the building, the hand on the dial being operated by chain and gears from the valve. The operator when asked to give status of the valve, by a glance at the dial, can accurately give the number of turns the valve is open.

"We have found the device reliable and sufficiently accurate. The cost is not great, being approximately $125.00, including installation, concrete pit, etc."

NOMINATIONS FOR A. G. A. OFFICERS ANNOUNCED

Announcement has been made by A. G. A. headquarters of the following report of the general nominating committee which will be presented to the annual convention in Atlantic City, N. J., in October, 1928:

For President—Oscar H. Fogg, vice-president, Consolidated Gas Co. of New York, N. Y.

For Vice-president—Bernard J. Mullaney, vice-president, The Peoples Gas Light and Coke Co., Chicago, Ill.

For Treasurer—Clifford E. Paige, vice-president, The Brooklyn Union Gas Co., Brooklyn, N. Y.

For Directors—R. B. Brown, Milwaukee Gas Light Company, Milwaukee, Wis.; Henry L. Doherty, H. L. Doherty & Co., New York, N. Y.; W. W. Freeman, Columbia Gas & Electric Corp., New York, N. Y.; R. C. Hoffman, Standard Gas Equipment Corp., Baltimore, Md.; Samuel Insull, Jr., Midland Utilities Co., Chicago, Ill.; J. B. Klumpp, The United Gas Improvement Co., Philadelphia, Pa.; F. A. Lemke, Humphrey Co., Kalamazoo, Michigan; A. B. Macbeth, Southern California Gas Co., Los Angeles, Cal.; Chas. R. Pritchard, Lynn Gas & Electric Co., Lynn, Mass.

The nominating committee consists of H. H. Genser, chairman, J. D. Creveling, E. L. Hall, A. E. Merchant, J. Arnold Norcross, and W. L. Smith.

JUNE MERCHANDISING IN NEW ORLEANS

As a special inducement in June to buyers of gas ranges the commercial department of the New Orleans Public Service, Inc., allowed a ten per cent discount from the purchase prices of new ranges on any old stove turned in, with a down payment of 99 cents and 12 months for the balance. Ranges for June brides were also featured, and bridal gift ranges were held until delivery was desired by the recipients.

CARDIFF LEAVES GAS FIELD FOR HOTEL CO. PRESIDENCY

Robert L. Cardiff, formerly manager of the Coast Division of the Coast Counties Gas & Electric Company, with headquarters at Santa Cruz, has resigned his post to take up his duties as president of the Beach Hotel Company & Santa Cruz Seaside Company. Mr. Cardiff was one of the oldest members of the Public Utilities of the Coast in point of service. For over 37 years he has been with the Coast Counties Gas & Electric Company, and the companies that preceded it.

A. L. Strong, formerly Superintendent of the Coast Division, takes Cardiff's place.

S. Waldo Coleman, formerly President of the Hotel Company is also President of the Coast Counties Gas & Electric Company.

VOTE FOR GAS AT DUKE

Citizens of Duke, Okla., have voted a 20-year gas distribution franchise to Vester Smith and R. M. Mitchell of McLean, Texas.

With *the* Metermen

The Effect *of* Water Vapor Upon Gas Measurement

By GUY CORFIELD
*Los Angeles Gas and Electric Corp.**

METER men do not always realize the extent to which water vapor affects gas measurements—how readily water vapor is absorbed by gas under some conditions, and how certain it is to separate out again as liquid under others. Particularly is this so in and near the oil fields where extremes of pressure and perhaps temperature are encountered. For instance, consider a gas saturated with water vapor at 2 lbs. pressure and 90° F. If this gas is compressed to 300 lbs. and cooled by condensers to this same 90° temperature, it will have lost water vapor, or volume, to the extent of 3.9 per cent. If expanded in the pipe line and passed over low spots or drips containing liquid water, the gas will start picking up the water again and increasing in volume.

GAS-WATER VAPOR LAWS

The laws governing a mixture of gas and water vapor, or gas in contact with liquid water, are very definite and quite simple. There are only two—(1) that gas at any definite temperature and pressure can absorb or carry only a corresponding maximum amount of water vapor, and (2) that the possible water vapor content increases with temperature and decreases with pressure. As these two conditions of temperature and pressure work against each other each is equally important, and they must always be considered together whenever a measurement is to be made or calculated. Each set of conditions has corresponding to it a definite content of water vapor at which the gas is saturated. Change these conditions and the gas will either become unsaturated and ready to pick up more water, or will go beyond its saturation point and be compelled to drop out water. Starting with an unsaturated gas, the conditions may be varied considerably without reaching the saturation point, but if they are varied so as to go beyond the saturation point liquid water will be dropped out;—varied still further the gas may again become unsaturated. This is what happens to the atmosphere before, during and after a foggy night. In the afternoon water vapor is carried in invisible true vapor form, but at night the colder temperature with perhaps a change in the barometer reading will cause a condition of supersaturation, and fog, or small particles of liquid water will settle out. In the morning when the sun comes out the conditions are again changed, the atmosphere becomes unsaturated and is able to re-absorb the fog. It is evident that there will only be a change in a gas-water vapor mixture if liquid water settles out, or if unsaturated gas comes in contact with water.

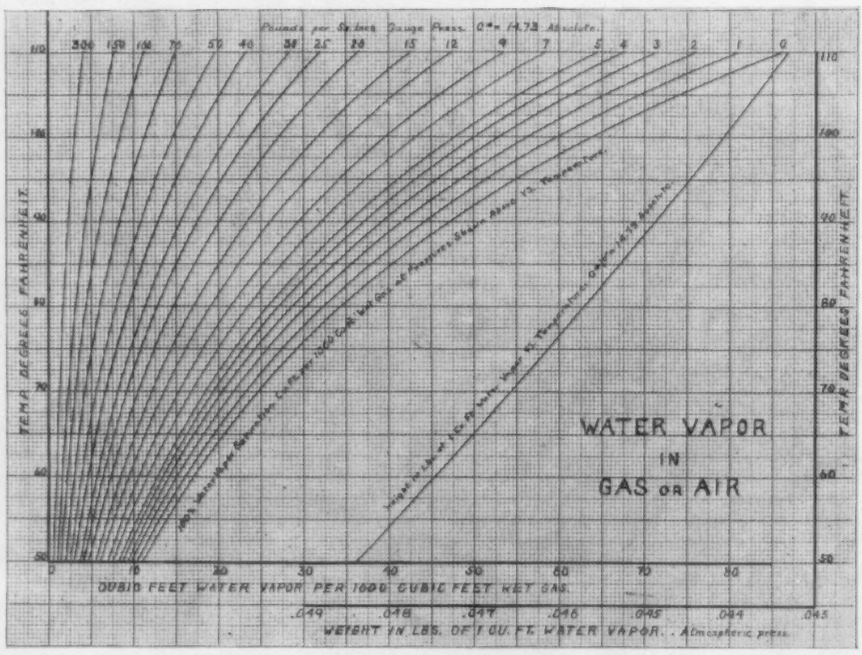
While this seems very complicated, calculations are extremely easy if the data of saturation values at various conditions are available in convenient form. The accompanying chart of "Water Vapor in Gas or Air" gives such data for ranges from zero to 300 lbs. gauge pressure and 50 to 110 deg. F. Higher and lower ranges could easily be added if required. A few simple calculations will be gone through later.

MEASURING WATER VAPOR

Let us now consider ways and means of measuring the water vapor content of gas. Of course if the gas is known to be saturated, as when it issues from the wells or from the discharge of a compressor station equipped with condenser coolers, we need only to read the pressure gauge and thermometer and then consult our chart, which will give us the percentage of water vapor present and allow us to follow the gas through any series of changing conditions. If it is not definitely known that the gas is saturated we have two means of testing for water vapor—(1) by wet and dry bulb thermometer, and (2) by absorption with chemicals.

If we insert an ordinary thermometer in a stream of gas we obtain the true temperature of the gas, but if we wrap the bulb of the thermometer with a small piece of rag, wet the rag with water and then insert the thermometer, we do not necessarily obtain the same temperature. If the gas is saturated with water vapor the thermometer will read the same as before the wet rag was wrapped around the bulb, but if the gas is not saturated the wet bulb temperature will always be lower than the dry bulb. The lower the reading of the wet bulb the more unsaturated is the gas. This low wet bulb

*Delivered before the Southern California Meter Association, June 28, 1928.


WATER VAPOR
IN
GAS OR AIR
TEMP. DEGREES FAHRENHEIT
CUBIC FEET WATER VAPOR PER 1000 CUBIC FEET WET GAS
WEIGHT IN LBS. OF 1 CU. FT. WATER VAPOR.

Monthly Meeting Held *on* June 28

MEETING on June 28 at the Los Angeles Gas and Electric Corp. Cafeteria for their monthly banquet and business session, members of the Southern California Meter Association heard an interesting paper on "The Effect of Water Vapor upon Gas Measurement," delivered by Guy Corfield, chemist for the Los Angeles Gas and Electric Corporation. Mr. Corfield's paper was accompanied by blackboard demonstration and a spirited discussion followed it. The paper appears in this issue of *Western Gas*.

Election of officers for the coming year, which was scheduled for the June meeting, was necessarily postponed due to lack of a quorum. Mailed announcement will be made to members as to future date of the election.

President T. K. M. Smith presented prizes to winners in the June 24 "Blind Bogey" golf tournament held for Association members. Pann was the recipient of first prize. a golf bag. Second and third prizes, which were given to C. A. Wheeler and M. L. Fort, consisted of nine, and three golf balls respectively. Appreciation was expressed on the behalf of the Association to the Fluor Construction Company, donor of these prizes for the June tourney, and to Robinson Orifice Fitting Company, which gave the prizes for May.

reading is caused by evaporation of the water from the rag into the gas, the same effect as enables one to cool a bottle of water, even on a hot day, by wrapping a wet rag around it. Obviously, the more unsaturated the gas the more evaporation there will be and the colder will be the wet bulb temperature--and again, if the gas is completely saturated there can be no evaporation and the wet and dry bulb readings will be the same.

When the wet bulb is inserted in the moving gas stream the temperature will immediately drop, rapidly at first and then more slowly, and finally become constant. This constant reading is the wet bulb temperature, a condition of equilibrium wherein the heat coming from the gas exactly balances the cooling effect of evaporation. This wet bulb temperature will persist until all the water is evaporated from the rag, when the

TABLE I.—*Temperature of dew-point in degrees Fahr.*

Air Temperatures	Vapor Pressure	Depression of wet-bulb thermometer																																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
0	.0383	— 7	—20																																	
5	.0491	— 1	— 9	—24																																
10	.0631	5	— 2	—10	—27																															
15	.0810	11	6	0	— 9	—26																														
20	.103	16	12	8	2	— 7	—21																													
25	.130	22	19	15	10	5	— 3	—15	—51																											
30	.164	27	25	21	18	14	8	2	— 7	—25																										
35	.203	33	30	28	25	21	17	13	7	0	—11	—41																								
40	.247	38	35	33	30	28	25	21	18	13	7	— 1	—14																							
45	.298	43	41	38	36	34	31	28	25	22	18	13	7	— 1	—14																					
50	.360	48	46	44	42	40	37	34	32	29	26	22	18	13	8	0	—13																			
55	.432	53	51	50	48	45	43	41	38	36	33	30	27	24	20	15	9	1	—12	—59																
60	.517	58	57	55	53	51	49	47	45	43	40	38	35	32	29	25	21	17	11	4	—08	—36														
65	.616	63	62	60	59	57	55	53	51	49	47	45	42	40	37	34	31	27	24	19	14	7	— 3	—22												
70	.732	69	67	65	64	62	61	59	57	55	53	51	49	47	44	42	39	36	33	30	26	22	17	11	2	—11										
75	.866	74	72	71	69	68	66	64	63	61	59	57	55	54	51	49	47	44	42	39	36	32	29	25	21	15	8	— 2	—23							
80	1.022	79	77	76	74	73	72	70	68	67	65	63	62	60	58	56	54	52	50	47	44	42	39	36	32	28	24	20	13	6	— 7	—53				
85	1.201	84	82	81	80	78	77	75	74	72	71	69	68	66	64	62	61	59	57	54	52	50	48	45	42	39	36	32	28	24	19	12	3	—12		
90	1.408	89	87	86	85	83	82	81	79	78	76	75	73	72	70	69	67	65	63	61	59	57	55	53	51	48	45	43	39	36	32	28	24	19	11	1
95	1.645	94	93	91	90	89	87	86	85	83	82	80	79	78	76	74	73	71	70	68	66	64	62	60	58	56	54	52	49	46	43	40	37	33	29	24
100	1.916	99	98	96	95	94	93	91	90	89	87	86	85	83	82	80	79	77	76	74	72	71	69	67	65	63	61	59	57	55	52	50	47	44	41	37
105	2.225	104	103	101	100	99	98	96	95	94	93	91	90	89	87	86	84	83	82	80	78	77	75	74	72	70	68	67	65	63	61	58	56	54	51	48
110	2.576	109	108	106	105	104	103	102	100	99	98	97	95	94	93	91	90	89	87	86	84	83	81	80	78	77	75	73	72	70	68	66	64	62	60	57
115	2.975	114	113	112	110	109	108	107	106	104	103	102	101	99	98	97	96	94	93	92	90	89	87	86	84	83	81	80	78	76	78	73	71	69	67	65
120	3.425	119	118	117	115	114	113	112	111	110	108	107	106	105	104	102	101	100	98	97	96	94	93	92	90	89	87	86	84	83	81	80	78	76	75	73
125	3.933	124	123	122	121	119	118	117	116	115	114	112	111	110	109	108	106	105	104	103	101	100	99	97	96	95	93	92	90	89	88	86	84	83	81	80
130	4.504	129	128	127	126	124	123	122	121	120	119	118	116	115	114	113	112	110	109	108	107	106	104	103	102	100	99	98	96	95	94	92	91	89	88	86

USE OF TABLES

On the first line of the table find the number corresponding to the number of degrees the wet bulb thermometer reading differs from that of the dry bulb and in that column on the line of the observed air temperature (dry bulb reading) found in the first column,

Table I will show temperature of dew-point and

Table II relative humidity per cent.

Example:

Air temperature	70
Wet bulb temperature	61
Depression of wet bulb	9
Dew-point temperature	55 degrees
Relative humidity	59 per cent

TABLE II.—*Relative humidity, per cent. Fahrenheit temperatures.*

Air Temperature	Depression of wet-bulb thermometer																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
0	67	33	1																																
5	73	46	20																																
10	78	56	34	13																															
15	82	64	46	29	11																														
20	70	70	55	40	26	12																													
25	87	74	62	49	37	25	13	1																											
30	89	78	67	56	46	36	26	16	6																										
35	91	81	72	63	54	45	36	27	19	10	2																								
40	92	83	75	68	60	52	45	37	29	22	15	7																							
45	93	86	78	71	64	57	51	44	38	31	25	18	12	6																					
50	93	87	80	74	67	61	55	49	43	38	32	27	21	16	10	5																			
55	94	88	82	76	70	65	59	54	49	43	38	33	28	23	19	14	9	5																	
60	94	89	83	78	73	68	63	58	53	48	43	39	34	30	26	21	17	13	9	5	1														
65	95	90	85	80	75	70	66	61	56	52	48	44	39	35	31	27	24	20	16	12	9	5	2												
70	95	90	86	81	77	72	68	64	59	55	51	48	44	40	36	33	29	25	22	19	15	12	9	6	3										
75	96	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24	21	18	15	12	9	7	4	1							
80	96	91	87	83	79	75	72	68	64	61	57	54	50	47	44	41	38	35	32	29	26	23	20	18	15	12	10	7	5	3					
85	96	92	88	84	81	77	73	70	66	63	59	57	53	50	47	44	41	38	36	33	30	27	25	22	20	17	15	13	10	8	6	4	2		
90	96	92	89	85	81	78	74	71	68	65	61	58	55	52	49	47	44	41	39	36	34	31	29	26	24	22	19	17	15	13	11	9	7	5	3
95	96	93	89	86	82	79	76	73	69	66	63	61	58	55	52	50	47	44	42	39	37	34	32	30	28	25	23	21	19	17	15	13	11	10	8
100	96	93	89	86	83	80	77	73	70	68	65	62	59	56	54	51	49	46	44	41	39	37	35	33	30	28	26	24	22	21	19	17	15	13	12
105	97	93	90	87	84	81	78	75	72	69	66	64	61	58	56	53	51	49	46	44	42	40	38	36	34	32	30	28	26	24	22	21	19	17	15
110	97	93	90	87	84	81	78	75	73	70	67	65	62	60	57	55	52	50	48	46	44	42	40	38	36	34	32	30	28	26	25	23	21	20	18
115	97	94	91	88	85	82	79	76	74	71	69	66	64	61	59	57	54	52	50	48	46	44	42	40	38	36	34	33	31	29	28	26	25	23	21
120	97	94	91	88	85	82	80	77	74	72	69	67	65	62	60	58	55	53	51	49	47	45	43	41	40	38	36	34	33	31	29	28	26	25	23
125	97	94	91	88	86	83	80	78	75	73	70	68	66	64	61	59	57	55	53	51	49	47	45	44	42	40	38	37	35	33	32	30	29	27	26
130	97	94	91	89	86	83	81	78	76	73	71	69	67	64	62	60	58	56	54	52	50	48	47	45	43	41	40	38	37	35	33	32	30	29	28

thermometer will start to rise again and finally assume the dry bulb or true temperature of the gas.

A convenient means of obtaining the wet and dry bulb temperature of a gas is to attach to an outlet in the main a short length of small pipe or flexible hose to which is connected a nine-inch length of 1¼-inch pipe. On the discharge end of this 1¼-inch pipe are screwed two 1¼-inch tees, through which are inserted the wet and dry bulb thermometers, so that they are in the gas stream when gas is turned on at the connection. Considerable variation of flow can be permitted without changing the relation of the two readings;—a slight hissing or singing noise in the apparatus indicates sufficient gas flow. This will give us the wet and dry bulb readings on the gas at atmospheric pressure, and eliminates the difficulty of inserting a thermometer into a main under pressure. By means of the second accompanying chart, on "Relative Humidity," these two thermometer readings can be interpreted to give us the percentage saturation of the gas at this true or dry bulb temperature and atmospheric pressure. By percentage saturation is meant the amount of water vapor in the gas expressed as a percentage of what the gas could carry at that temperature and pressure if it was completely saturated. This gives us a basis of calculation, and is an easy and rapid method sufficiently accurate for most purposes.

The second and most accurate method for determining water vapor in gas consists of passing a metered quantity of gas through a chemical that will absorb the water vapor. The chemical is put in small glass U-tubes that can be weighed before and after the test, and the weight of water absorbed from a known volume of gas gives us another basis for calculation. The most commonly used chemical is calcium chloride which, if two tubes are used and the gas is passed through slowly and for not too long, will absorb practically all the water vapor. For most accurate results a more active chemical, phosphorous pentoxide, should be used. The latter is easier to use and handle if mixed with half its volume of clean dry sand. By itself it tends to plug the tubes and to channel. Neither of these two chemicals will absorb gasoline vapors or anything out of natural gas except water vapor.

EXAMPLES

Let us conclude by working out a few typical examples, starting with the one already mentioned of a gas before and after a compressor plant. It is received saturated with water vapor at 2 lbs. pressure and 90° F. From the chart of "Water Vapor in Gas," by following the 100 per cent saturation line for 2 lbs. pressure, we find that under these conditions the gas will contain 41.5 cu. ft. of water vapor per 1000 cu. ft. of wet gas—or, in other words, 41.5 cu. ft. of water vapor and 958.5 cu. ft. of dry gas. The gas is now compressed to 300 lbs. and cooled to 90° F. again. Under this condition the chart shows it to contain 2.25 cu. ft. of water vapor per 1000 cu. ft. of wet gas—or 2.25 cu. ft. of water vapor and 997.75 cu. ft. of dry gas. As a means of comparison we must reduce this to the basis of the first measurement, which was 958.5 cu. ft. of dry gas—or, in other words, if 997.75 cu. ft. of dry gas carries 2.25 cu. ft. of water vapor, then 958.5 cu. ft. of dry gas under the same conditions carries 2.25 multiplied by 958.5 divided by 997.75 equals 2.16 cu. ft. of water vapor. Therefore 1000 cu. ft. of wet gas (958.5 cu. ft. of dry gas plus 41.5 cu. ft. of water vapor) goes into the compressor station and comes out as 960.66 cu. ft. of wet gas (958.5 cu. ft. of dry gas plus 2.16 cu. ft. of water vapor). The loss in volume is 1000 minus 960.66 equals 39.34 cu. ft., or on the basis of the original measurement a loss of 3.9 per cent.

Now consider a gas in a pipe line. A wet and dry bulb test on this gas with the described apparatus gives us 57° wet bulb and 75° dry bulb. By consulting the chart of "Relative Humidity" we see that this gas is 30 per cent saturated. The chart of "Water Vapor in Gas" shows that gas saturated at atmospheric pressure and 75° F. contains 29.25 cu. ft. of water vapor per 1000 cu. ft. of wet gas. As the gas being tested is only 30 per cent saturated it really contains 30 per cent of 29.25, equals 8.8 cu. ft. of water vapor per 1000 cu. ft. of wet gas. Suppose we had determined this by chemical absorption and passed 10 cu. ft. through a meter and absorption tubes at 75° F. Our weight of absorbed water would be .00405 lbs. Therefore 1000 cu. ft. would contain .405 lbs. From the chart of "Water Vapor in Gas" we see from the single line on the right that one cu. ft. of water vapor at 75° weighs .0461 lbs. Therefore, .405 lbs. would be equivalent to .405 divided by .0461 equals 8.8 cu. ft. water vapor. Let us now suppose that the gas passes a low spot in the line where water has collected, and absorbs some of it, so that by test it contains 17.6 cu. ft. of water vapor per 1000 cu. ft. of wet gas. By a calculation similar to the one followed through in the first example the gas will be found to have increased in volume 0.9 per cent, due to having picked up water in the main.

From these two examples it will be seen that often the change in volume is quite appreciable and worthy of consideration if careful measurements are being made.

SALINA'S IMPROVEMENTS

Orders have been approved by the Pacific Gas and Electric Company for new blowers and exhausters in the Salinas, Calif., plant of the Coast Valleys Gas and Electric Company, involving an expenditure of $5,600, according to J. F. Pollard, division manager of the company.

CONVENTION TRIP SPURS TO SALES EFFORT

Both the Pacific Gas and Electric Company, San Francisco, and the Southern Counties Gas Company, Los Angeles, are conducting sales campaigns on gas water heaters, with a trip to the Coronado Convention of the Pacific Coast Gas Association in September held out as grand prize to the winning salesman. The Southern Counties' campaign of last year, for which a trip to the P. C. G. A. Santa Cruz convention was offered as first prize was highly successful.

A. B. DAY TRIES STANDARD OIL AIRCRAFT

A. B. Day, president and general manager of the Los Angeles Gas and Electric Corp., on June 29 was the guest of the Standard Oil Company on a flight over sections of Los Angeles basin in one of the Standard's trimotored planes, newly purchased.

Two Important Dates

Pacific Coast Gas Association, 35th Annual Convention—Hotel Coronado, Coronado, California, September 17 to 20.

American Gas Association—Atlantic City, N. J., October 8, 9, 10, 11 and 12.

MORE COMPRESSOR CAPACITY FOR TUCSON COMPANY

Installation of additional compressor equipment at the plant of the Tucson Gas, Electric Light and Power Company, Tucson, Ariz., is announced by C. H. Webber, superintendent of that utility's gas department. A compressor delivering 75,000 cubic feet per hour, driven by a 150-horse power motor, will maintain a gas pressure of 50 pounds. The new compressor apparatus is demanded by recent installation of a new 50,000 cu. ft. gas holder, and also is a part of the company's program for dehydrating its gas. The equipment is being added at a most of $20,000.

SELL GAS DEPT. OF NEW YORK OIL COMPANY

At the annual stockholders meeting of the New York Oil Company held in Casper, Wyo., June 4, sale of the gas properties of the company by the Forman interests of Chicago to the Northern Utilities Company was ratified.

INTEREST IN GAS HOLDINGS OF NEW MEXICO OPERATOR

A one-third interest in Lea County, New Mexico, holdings of the Texas Production Company has been purchased by the Amerada Corp. and the Columbia Carbon Company, the holdings comprising 9,000 acres to be operated jointly by the three companies. Several carbon black plants are reported contemplated by the Columbia Carbon Company on these New Mexico properties.

POMONA FRANCHISE

The United Gas Service Company was granted a gas franchise, early in June by the citizens of Pomona, Kansas. Gas will be supplied to the city from the Cities Service line being constructed from Wichita to Ottawa. This line runs five miles south of Pomona.

DALLAS GAS CO. MAN HEADS CITY PURCHASING AGENTS

B. R. Newberry, purchasing agent of the Lone Star Gas Company, Dallas, was recently installed as president of the Dallas Purchasing Agents' Association.

J. S. ZINK LEAVES OKLAHOMA NATURAL FOR SALES WORK

John S. Zink, for 11 years in charge of the Industrial gas department of the Oklahoma Natural Gas Corporation, Tulsa, has severed connections with that organization to establish offices in Tulsa, where he will do combustion engineering work. He represents the Coen Company of Los Angeles and San Francisco, manufacturers of Coen Combination Mechanical Oil and Gas Burners.

TEXAS CO. SELLS DOMESTIC GAS SYSTEM

The Texas Company has announced sale of that part of its gas distributing systems supplying gas to domestic consumers, to the Moran Corporation, for $28,859 cash. Communities affected by the sale are Mooringsport, Oil City, Vivian, Hosston, and other communities in Caddo, DeSoto and Red River Parishes, Louisana, and Panola County, Texas. The Texas Company will supply gas to the Moran Corporation at 15 cents per 1,000 cubic feet so long as this amount is not needed by industrial consumers, according to terms of the sale.

The Gas Appliance Service Corporation of Dallas, Texas has been appointed Texas representative of the Gilfillan line, 2104 Bryan street. A. P. Stephens is president of the Dallas organization.

CALGARY GAS PROGRAM CALLS FOR MILLION IN 1928

Involving an expenditure of approximately $1,000,000, the proposed program of extensions by the Calgary Gas Company for 1928 was announced recently by officials of the company. It is the intention of the company to lay about thirteen miles of new mains in various parts of the city of Calgary. It is also considered probable that by the end of this year a start will have been made in laying a pipe from the Turner Valley field to the city of Calgary. Two standard wells will be drilled on new structures. In addition to this new work the existing lines will be renovated and enlarged, and new mains will be laid to various towns and cities outside Calgary, Alberta.

TWO GASOLINE PLANTS ARE BUILDING AT LONG BEACH

Construction of a new natural gasoline absorption plant has been begun on the property of the Bankline Oil Company at the corner of Willow and Temple Streets, Long Beach, Calif. J. A. Campbell, natural gasoline engineer, with headquarters in Long Beach, was awarded the contract for the construction of the plant, which will have a capacity of 20,000 gallons.

Another contract that has just been awarded to J. A. Campbell calls for the construction of a new gasoline plant for the Gilmore Oil Company at Long Beach, with a minimum capacity of 30,000 gallons. This plant is to be constructed on Linden Street, near Columbia Avenue in Long Beach, and the work will be rushed to completion.

NEW SERVICE UNIFORMS FOR SO. COUNTIES GAS CO.

Neat whipcord uniforms of an attractive olive shade now distinguish the employees of the Southern Counties Gas Company who call at the homes of gas consumers throughout the company's system from Santa Barbara to Laguna Beach, Calif. Gas inspectors, adjusters, meter readers, collectors, appliance men and foremen are clad in the new uniforms. The name of the Southern Counties Gas Company appears on the caps, the auto used by the men bears a similar inscription, each man wears a gas company badge and carries an identification card.

This is another step in the development of the service policy of the company and is taken as an additional protection to the company's patrons. Occasionally homes are called on by imposters who claim to be inspectors, meter readers or other employees of the gas company—using this as a pretext to gain admittance. The uniform with its additional identification of the badge, card, and other distinguishing features is a protection to all homes served by the gas company.

AUSTRALIAN COMPANY HEAD IN VANCOUVER, B. C.

Andrew Wilson, general manager, Australia Gas, Light & Coke Company, Sydney, New South Wales, recently landed in Vancouver, B. C., en route to England from the Antipodes. Mr. Wilson was on a business trip.

EDMONTON COMPANY TO CARRY LINES INTO SASKATCHEWAN

Pipelines of the Wainright Gas Company of Edmonton, Alberta, are to be carried into western Saskatchewan, according to Walter S. Campbell, president of the company, on his return from a business trip to eastern Canada. He has been arranging for contracts and securing of territory with a view to an early extension of this utility into the neighboring province.

New Gas Refrigerator *in* Commercial Sizes

A NEW type of refrigeration which utilizes gas and does away with all moving parts in the refrigeration cycle is that of the Silica Gel system, now being manufactured by the Copeland-Silica Gel Corporation of Detroit, Mich., a subsidiary of the Copeland Products, Inc., manufacturers of electric refrigeration.

In the new process the Silica Gel replaces the compressor of an electric machine, eliminating the driving motor and its constantly moving parts. Silica Gel exercises the principle of capillary attraction. Chemically, Silica Gel is silica, but it differs from ordinary silica in its molecular arrangements.

The Silica Gel apparatus operates on the dry adsorption and is intermittent in action, but the parts are so proportioned and action regulated by time clock and automatic control that uninterrupted refrigeration is obtained.

Contained in steel tubes, the Silica Gel, is used to maintain the refrigeration cycle. Through its capillary attraction the Silica Gel adsorbs the refrigerant vapor. Heat is then applied to expel the ad refrigerant from the gel. A gas burner, operated by a time clock which shuts off and turns on the gas when needed, supplies the heat.

As the Gel is freed from the refrigerant, this refrigerant passes on to the condenser where it liquefies and is conveyed back into the cooling chamber just the same as in the compression type of machine.

Silica Gel has been used for some time in refrigerating cars, utilizing Pintsch gas, and has functioned so perfectly that it is possible to load a car of fish on the Atlantic seaboard and ship direct to Texas without reloading. Heretofore it was necessary to re-ice at least once along the way. A temperature of 10° below zero was maintained.

The new Silica Gel refrigerators are to be confined at first to the commercial type, such as boxes for meat markets, soda fountains and for multiple installations in apartment houses.

11.05 GAIN IN SALES SHOWN IN P. G. AND E. REPORT

ACCORDING to the annual report of F. A. Leach, Jr., first vice-president and general manager of the Pacific Gas and Electric Company, just issued, gas sales in 1927 aggregated 20,214,834,600 cubic feet of which 19,414,594,600 cubic feet, or 11.05 per cent more than in 1926, represented sales on the P. G. and E. system. An aggregate of 800,240,000 cubic feet of gas was sold during the year to consumers of the Western States Gas and Electric Company and Coast Valleys Gas and Electric Company.

Quoting the report further:

"The per capita consumption of gas continues to increase, each of the 432,263 customers connected to the Pacific Company's system purchasing an average of 45,590 cubic feet, compared with an average of 43,310 cubic feet in 1926. Indicative of the steadily growing average consumption, it may also be pointed out that in the last 10 years total sales of gas on all of the Company's properties have increased 136.8 per cent, compared with an increase of 86.3 per cent in the aggregate number of consumers served.

"Our gas distribution system embraces 4,999 miles of mains ranging in diameter from 2 inches to 36 inches, and opearted under pressures ranging from one-fourth of a pound to one hundred pounds per square inch. Expressed in terms of pipe averaging 3 inches in diameter, the length of the company's transmission and distribution mains would aggregate upwards of 23,000 miles.

"The efforts of the sales department continued to be devoted primarily to increasing the load on the company's existing facilities. A measure of the success achieved in this direction is found in the fact that out of 2,520 major contracts signed during the year, 2,075, or approximately four-fifths of the total required no extension of our distribution systems."

KARR REVIEWS GAS STATUS IN MISSOURI

Fred Karr, director of public relations for the Gas Service Company, Kansas City, Mo., in an address before the Missouri Association of Public Utilities at Jefferson City, brought out the following facts on gas consumption in Missouri:

Some forty-four communities, with a population of approximately 1,700,000 or 50 per cent of the entire population of the state, are using gas. Only about eight communities are using natural gas The larger cities served with natural gas are: Kansas City, Joplin, Carthage, Webb City, all of these being along the western border of the state. During the year 1926 natural gas companies in the state supplied approximately seven billion cubic feet of natural gas and manufactured gas companies about eleven billion cubic feet.

There are approximately 1,278,000 people in the state of Missouri using manufactured gas, and approximately 554,300 people using natural gas.

During 1926 the natural gas consumption in the state was 12,600 feet per capita, sold at an average price of approximately 80c per thousand. During the same period the artificial consumption was approximately 8,600 feet per capita which was sold at an average price of approximately $1.40 per thousand.

SALT LAKE COOKING SCHOOL

Late in May the Utah Gas & Coke Company held a three-day cooking demonstration in its Salt Lake auditorium. Miss Barbara Badger, head of the utility's new home service department, was in charge of the cooking school. A cake-baking contest with cash prizes was conducted.

GREAT FALLS CHANGE-OVER CALLING FOR $500,000

According to W. A. Baehr of Chicago, president of the North Continent Utilities Corp., more than $200,000 has already been spent in equipping properties of the Great Falls Gas Company, Great Falls, Mont., subsidiary of the North Continent, for natural gas service. The change-over will eventually demand an expenditure of $500,000. Mr. Baehr spent some time in Great Falls early in June, together with J. W. Sykes, chief engineer of the North Continent; E. D. Mourer, assistant engineer, and A. H. Sikes, manager of the Great Falls Gas Company. Gas properties in Great Falls, Shelby, Kevin, Sunburst and Sweet Grass were inspected.

Hugoton, Kansas, will soon be piped for natural gas, according to W. L. Sidwell, holder of the city gas franchise. Pipe and material for the line have been ordered.

The Public Utilities Investment Company of Salina, Kansas has purchased the gas interests of the Eureka Gas Company of Eureka, Kansas, according to a press report. The Public Utilities Company owns properties in Kansas, Oklahoma, Missouri and Texas.

Lubricating Gas Engines Direct Connected *to* Gas Compressors

By Byron L. Rogers

Superintendent Compressor Stations, Lone Star Gas Company
Dallas, Texas

THE selection of the proper oils to use for particular operating conditions is of great importance. It is our belief that two oils should always be selected—a crank case oil of parafin base and not over 200 degrees, vis. at 100 degrees F., (most economical on account of its price, low emulsability, and the fact that it can be fed at a constant low rate with little attention); and a cylinder oil no lighter than 300° viscosity at 100° F. and never very much heavier than 400° viscosity at 100° F., a dewaxed oil of parafin base preferably and containing little residual carbon.

Assuming that the above oils are selected and that the feed of lubricators is maintained uniformly, if the installation uses more than one gallon of oil for 7,500 rated horse power hours, regardless of load, it may safely be concluded that some faulty mechanical conditions exist, or that the education of the operators has not received the attention it should have been given.

We would always recommend gradual reduction of feeds to this economical point, that the operators may be constantly sold on the idea that it is being done judiciously and that they may apprecaite the fact that maintenance costs are following the same downward trend.

If a properly designed gravity oiling system to bearings and guides be installed, including a centrifuge which need be operated only a small part of each day, the writer is positive that 15,000 horse power hours per gallon economy can be obtained without increasing maintenance costs. If not, it is due to faulty mechanical conditions, mis-alignment, or a lack of co-ordination among operators which can be remedied by proper instruction.

The above results are easily possible, assuming that the oil specifications are adhered to by companies furnishing the oil chosen.

It is our belief that all excess oil fed into power cylinders contributes to the grief which is often so abundant in gas engine plants of any size. We have, therefore, gone on the theory that a gas engine cylinder oil should be selected, which will form a thin unbroken film on the moving parts instantly, and the little which remains and is exposed to the temperature of combustion will be flaked off on the scavenging stroke and expelled in the exhaust. This theory has been demonstrated to our entire satisfaction over a period of several years, resulting in some economy figures which the writer fears would tax the credulity of many who may read this article.

To make such economies possible, however, the operator must not only be convinced by demonstration that very few drops of oil will form a film over a surprising amount of surface, but that every drop of oil, which may be thrown from moving parts, splashed out of the crankcase or allowed to drip from the engine or run down over the foundation, is forever lost and has no rightful place in his argument that such economies as stated above are not possible.

It should be definitely understood that the figures as given above are obtained by dividing the product of the compressing engine hours operated and the rated horse power of the engines by the total gallons of oil used for any purpose in the entire plant. It will be seen from this that the oil used on auxiliary machinery, pumps, etc., is included in the plant total and charged against only the actual horse power hours of compressing engine operation.

TEXHOMA NOW HAS NATURAL GAS DISTRIBUTION SYSTEM

The new natural gas distribution system of the Texas County Gas Company, Texhoma, Okla., was opened for service June 18. The construction crew of the company has now moved to Goodwell, where a gas distribution system will be installed. Service is promised for Goodwell by September 1.

ASK BUTLER FRANCHISE

A gas franchise has been applied for before the city council of Butler, Mo., on behalf of the Missouri-Kansas Pipe Line Company.

GENERAL UTILITIES CO. HAS WICHITA HEADQUARTERS

The General Utilities Company, a $2,000,000 corporation owning gas franchises in seven central Kansas towns, has established its general office at Wichita, Kansas, in the First National Bank Building.

NATURAL GAS GASOLINE OPERATIONS

Compiled by E. T. Knudsen
Department of Commerce, Bureau of Mines, Division of Mineral Resources and Statistics

ONE hundred and thirty-five natural-gas gasoline plants with a daily indicated capacity of 1,566,050 thousand cubic feet, report a recovery of 45,247,635 gallons of natural-gas gasoline from 30,549,502 thousand cubic feet of gas treated in May. This is an increase of 644 barrels in daily average production.

Utilization of natural-gas gasoline amounted to 947,602 barrels, an increase over April of 28,169 barrels. Daily average utilization of 30,568 barrels was 4,184 barrels less than daily average production of 34,752 barrels.

Stocks of natural-gas gasoline at the end of May amounted to 833,807 barrels of which 34,188 barrels were reported by natural-gas gasoline plant operators and 799,619 barrels by refinery operators. This is an increase of 143,479 barrels over April stocks. This stock figure of 833,807 barrels is approximately twenty-seven days supply at the current rate of consumption.

Production of gasoline during the month of May amounted to 5,159,095 barrels, a daily average of 166,422 barrels. This is an increase in total production of 263,643 barrels or 5.39 per cent over April output, and an increase of 294,862 barrels or 6.06 per cent over the output of May, 1927.

Of the total gasoline produced, 22,967 barrels were reported as finished gasoline produced by natural-gas gasoline plant operators. Production of gasoline from cracking processes decreased in May to 471,911 barrels.

Stocks of gasoline show a decrease of 613,266 barrels during May and at the end of the month amounted to 11,629,986 barrels. This stock figure includes 23 barrels of finished gasoline reported by natural-gas gasoline plant operators.

CALIFORNIA NATURAL-GAS GASOLINE PRODUCTION, DISTRIBUTION AND STOCKS

MAY, 1928

PRODUCTION	Gas Treated M. C. F.	Natural-gas Gasoline Produced (Gallons)	Gasoline Recovery per MCF Gas Treated
Type of Plant			
Oil Absorption	21,014,723	30,011,018	1.428
Compressor	252,681	297,499	1.177
Combination Comp. and Oil Absorption	9,282,098	14,927,486	1.608
Drip	.....	11,632	.....
Totals	30,549,502	45,247,635	1.481
Finished Gasoline produced at plants	22,967 Bbls.		

DISTRIBUTION					
Stocks First of Month				690,328	Bbl.
Production during Month				1,077,325	"
Quantity Mixed with crude or unfinished oils	135,826	Bbl.			
Used in Blending at Refineries	804,175	"			
Stocks End of Month	833,807	"			
Used at Plants, Shortage and Evaporation Losses	7,601	"			
Balance				13,756	"
	1,781,409	"		1,781,409	"

STOCKS				
Natural-gas Gasoline held by Natural-gas Gasoline Plant Operators	1,435,898 Gals.	or	34,188	Bbls.
Natural-gas Gasoline held by Refiners	33,583,998 "	"	799,619	"
Totals	35,019,896 "	"	833,807	"
Finished Gasoline (Motor Fuel) held by Natural-gas Gasoline Plant Operators			23	"

FRANK ELCOCK IS NEW HEAD OF CANADIAN GAS ASSN.

About 100 gas men from all sections of Canada registered for the twenty-first annual convention of the Canadian Gas Association, called to order on June 21 at the Royal Connaught Hotel, Hamilton, Ontario, for a two-day session.

Frank Elcock of Ottawa was elected president of the Association for the year ahead, succeeding P. V. Byrnes, deceased. Mr. Elcock was first vice-president last year, A. T. Leavitt of the Hamilton By-Products Coke Ovens, Ltd., filling this post for the coming year. G. W. Allen of Toronto is secretary-treasurer of the Canadian Gas Association.

P. G. AND E. BUYS BUILDINGS AT STOCKTON, CALIF.

H. B. Heryford, division manager of the Pacific Gas and Electric Company at Stockton, Calif., announces that the P. G. and E. is purchasing the present office buildings occupied by the Western States Gas and Electric Company. These buildings are now under lease from their owners, Samuel Kahn and B. F. Wellington, Jr. The main two-story structure has a foundation which will permit the building of additional floors as the company's business expands.

Extensive alterations of the main floor interior of the building are contemplated soon.

NEW OFFICE AT ALHAMBRA FOR L. A. G. AND E.

Addison B. Day, president of the Los Angeles Gas & Electric Corp., has announced plans for a new Alhambra office and shop building to house the Alhambra district staff of the company. Alhambra, San Gabriel, Monterey Park, Wilmar and vicinity are served from Alhambra office headquarters. The building will stand on South First Street, near Main, and will probably be a two-story structure. Since the opening of the Alhambra District office on June 1st, 1924, with R. C. Gardner in charge as manager, the territory has increased in number of meters from 10,558 to 15,643, or 48 per cent. Gas sales have gained 70 per cent.

CALIF. NATURAL GASOLINE MEN ELECT FOR YEAR

At the third annual election of officers of the California Natural Gasoline Association, held at the Alexandria Hotel, June 14, 1928, the following officers were elected:

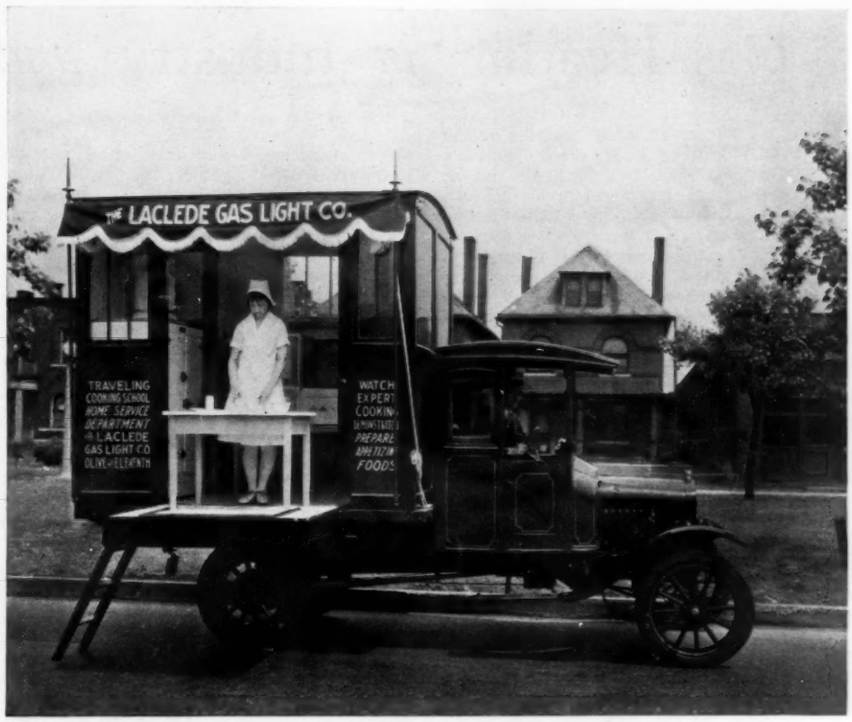
President—Geo. L. Ratcliff, General Petroleum Corporation.

Vice-President—H. L. Eggleston, Pan American Petroleum Co.

Directors—all two year terms—O. C. Field, O. C. Field Gasoline Corp.; R. W. Garman, Union Oil Co.; R. H. Green, Signal Gasoline Co., Inc.; E. R. Pratt, Honolulu Cons. Oil Co.; L. V. Cassoday, Lomita Gasoline Co.; C. E. Beesemyer, Gilmore Gasoline Co.; F. N. Rumbley, Lovell Gasoline Corp.; Ben A. Koehler, Geo. F. Getty, Inc.; J. F. Vordermark, Torrance Gasoline & Refining Co.; J. L. Denny, Calif. Eastern Oil Co.

THOMAS TO REPRESENT HOPE ENGINEERING & SUPPLY CO.

A. R. Thomas, following many years of service in the oil and gas business in the East and California, has been appointed distributing agent in the Los Angeles territory for the Hope Engineering & Supply Company, of Mt. Vernon, Ohio. Mr. Thomas came to California to become associated with the Modella Oil properties. Since 1922 he has been in the selling end of the oil and gas business, having specialized on gas engines, compressors and kindred lines. Offices have been established at 945 Western Pacific Building, Los Angeles.



A kitchen on wheels is the most recent contribution of the Laclede Gas Light Company, St. Louis, Mo., to home service practice

Gas Company Sponsors Modern "Chuck Wagon"

By NORMAN B. TERRY

WHEN the West was young, and courageous, pioneers blazed trails across trackless plains, the "chuck wagon" was always welcome—for on this kitchen-on-wheels "beans and bacon" were dispensed to those hardy makers of American history.

Today on the streets of St. Louis there is a modern counterpart of the famous chuck wagon of pioneer days. The Home Service truck operated by The Laclede Gas Light Company is a modern kitchen on wheels. This portable kitchen is furnished with a gas range, a refrigerator, water cooler, demonstration table and incinerator. On either side of the range are cupboards for dishes and cooking utensils. There's a ventilating fan in the rear window and cheerfully colored linoleum covers the floor. In every way this traveling kitchen is as up-to-date as the kitchen of a modern home.

Early each morning the truck visits various markets and other places where women congregate. A member of the company's Home Service department accompanies the truck and prepares simple dishes at each stopping point. Pyrofax gas is used in the range and while the cookies, biscuits, and cup cakes are cooking the demonstrator distributes recipes to the crowd.

That this kitchen on wheels is not a short-lived sensation is evinced by the fact that crowds continue to grow. Women look forward expectantly to its daily visits and as soon as the truck pulls up to the curb to prepare for a demonstration the crowd begins to gather. Women are anxious to know what new recipes are to be prepared as well as to get their copy of the new recipes. Popularity of this traveling kitchen is not confined to the women. Men form a part of the crowd at every demonstration and their interest reaches its height when the fragrant biscuits and cakes are taken from the oven.

Another innovation which the Laclede company has brought to St. Louis is Home Service demonstrations among the negro population. Mrs. Mary Cannon, an excellent cook, who has a high reputation among the Federation of Colored Women's Clubs, is employed as demonstrator. Demonstrations began early in April with one demonstration each week before the Urban League and the colored Y. W. C. A. So popular have these demonstrations become that they are now held at the rate of five each week. In addition to these five regular demonstrations many evening classes are held in the gas company's auditorium.

The idea which induced the Laclede company to employ this negro demonstrator is to bring Home Service instruction and recipes to the home through colored help. This is accomplished largely through demonstrations before neighborhood groups in close touch with the Y. W. C. A. and Urban League. Advertising space in two negro newspapers was used to announce this Home Service instruction. Miss Helen Wethrell, head of the Home Service department of the Laclede Gas Light Company, is enthusiastic over the success of this venture.

BRAUN OPENS HOUSTON OFFICE

C. F. Braun & Co., manufacturing mechanical engineers of Alhambra, California, have established an office in the Neils Esperson Building, Houston, Texas, with Mr. McCament in charge. Mr. McCament was formerly associated with the Dallas office of the company.

Fred Champion of the Southern Counties Gas Company of Los Angeles, accompanied by Mrs. Champion, departed for a three months tour of Europe on June 8.

Gas Heating *in* Industry *and in the* Home

falls to the lot of the plant engineer or the merchandise salesman, if there be such. Neither of these men can do justice to the job. The merchandise salesman has no knowledge of manufacturing or distribution conditions, neither has he the knowledge of equipment available for heavy duty work. The plant engineer is usually too busy with his thousand and one duties to pay much attention. To obtain any large quantity of industrial business we must use men technically trained, because in this age of quantity production most industries have technical men in their employ or have available the services of consulting engineers in matters of plant operations. Guess work has no place in modern industry. In addition to his technical training this man must have a certain amount of personality—or "IT." He must be able to talk the language of the man he is dealing with and in terms that are perfectly understandable; that is, he must talk baking to the baker, coffee roasting to the coffee roaster, etc. It is demanded that he familiarize himself with a working knowledge of the particular process involved. His contact with the prospect will give a pretty good indication as to whether he will get the business or not. He should also be familiar with the various heavy duty appliances on the market—at least those most commonly used. The lack of knowledge in many smaller properties is surprising. Just recently we had a call from one asking what a gas coffee urn was; another had sold a gas steam boiler for zinc melting.

Tell your prospect something about your business. It is often presumed that the other fellow knows as much about our business as we do; perhaps he does—but in most cases he doesn't; in fact his knowledge goes no further than his kitchen range and water heater. It will be news to him that other concerns are using gas advantageously. Show him there is equipment on the market built for his particular processes. Tell him what others are doing. If he sees money in sight he'll soon show interest and put you in touch with the right party. As previously stated, here is the place to use all the diplomacy in your system. Get the confidence of this man and don't attempt to go further without it. Then take your time, look around and decide upon some particular piece of work that you know is successfully done elsewhere and sell your man on that. If he boosts it, you're on the up grade; if he is not sold you may go over his head to the boss, but the odds are against you.

In making the final survey, be sure to get all of the facts; then make your figures. If you are not sure of your deductions, call in the manufacturer's representative; he will willingly help. Unless you have a very favorable gas rate, you will find in most cases that your fuel is higher than that for which you intend to substitute. For this reason you must carefully study operating conditions so as to have offsetting factors. Purchasers are by nature skeptical. You must leave no room for doubt.

SELL ON FACTS

When you present your figures, be positive in your statements. *Name your costs.* Don't shade them to make them look better than you think they will actually work out. It is far better to have the process actually work out better than your estimate. If the reverse, your customer will lose confidence.

Experience has taught that one of the best

(Continued from Page 29)

means of getting heavy duty business is the installation of equipment on trial. When this is done, the customer is usually impressed by the evidence of our being positive that we know what we are talking about. It is proof positive that we are ourselves sold on the proposition we are selling and would not go to the expense of installation if there were any doubt as to performance.

Sell your product on its merits. It has a fine record of achievement for controlability, dependability, efficiency, cleanliness, and economy.

You cannot expect the manufacturer to come to you. He's too busy with his business. You must go to him. You must adopt the same tactics the electrical industry uses—carry the fight into the other fellow's backyard. It's one of the main reasons why that industry has reached its gigantic proportions—real salesmanship did the job—it will do it for gas.

The proof of the pudding is in the eating. Talk is cheap—but will it work? Well, it has in St. Paul:

In 1910 we sold 16 million cubic feet of industrial gas; in 1926, 380 million. Of the 503 hotels, restaurants and other eating places, 96 per cent are completely gas equipped. In process work we range from the small soldering pot to the galvanizing furnace in our largest foundry, from the engraver to the enameling furnace of the refrigerator manufacturing plant that made practically all of the General Electric Company's cabinets last year, from the small home pie factory to the bake ovens that turn out 200,000 loaves of bread per day.

HOUSE HEATING

Nothing has caused so much consternation in the gas industry as has this matter of house heating. In some sections we could find companies that considered its advent nothing short of a calamity, while in others it was looked upon as the salvation of the industry—the public in the meantime not giving any thought to the matter aside from taking it for granted that it couldn't afford it.

Recent developments, however, show a marked change in the attitude of gas companies and the public as well. The gas man who has been "fighting off" house heating finds himself not able to do so any longer. The public wants it and is apparently willing to pay for it. The bugaboo of "tremendous winter demands" has been partially dispelled by studies made in communities where there is a sufficient number of customers so that average figures mean something, and a diversity factor has been found that shows the demand on the plant not nearly as heavy as was feared. The gas boiler man is selling boilers direct to the customer of the gas company—and the customer, in turn, is connecting the boiler up to the system. Can the industry afford to let the public think the heating problem is too difficult for solution by the industry? Here is business coming to us—why not go out and meet it and get all there is to get?

The oil burner has demonstrated that there is a market for house heating equipment that will relieve the householder of labor. The cost of the equipment is kept in the background. The prospect is sold a superior service that will add to the purchaser's comfort and convenience. In short, the purchaser is sold heating, not a heater.

Virtually every oil burner user is eventually a gas heating prospect. He is being given a taste of living at greater ease. The trend of cost of oil is not down. His equipment is not so simple as the gas heater and, therefore, requires more attention as time goes on. Gas heating is the simplest and most satisfactory type of automatic heating at present. The cost of equipment compares favorably with oil burning equipment of the better type. The cost of operation is well comparable to the motor car and we all know how generous we are with our automobile operating expense, compared to our other household expenses.

The field for house heating is broad because it has an appeal to the class whose incomes are between $5,000 and $15,000 per year. The selling features of gas heating have no appeal to the wealthy large home owners who have servants and caretakers for all work about the house.

In the sale of house heating we are also confronted with the rate problem. It must of necessity be profitable and at the same time low enough to be attractive, all factors of convenience, comfort and cleanliness being taken into consideration. Some business will come at regular rates—there is no doubt about that—but cost is a factor in getting quantity heating.

House heating must be sold very much like industrial heating, using the best of personnel and absolute integrity in submission of figures. There is only one way to do the job and that is to make a careful survey, then a true estimate and sell on that basis. The customer will know shortly whether he has been truthfully dealt with; the continuation of business relations depends upon how close your estimate comes to actual costs.

House heating is not new to the industry. Gas has been used for heating in natural gas territory for years and it is natural that it had its beginning in sections where the heating seasons were shortest. Now it is engaging the attention of the public in latitudes where heat is required during a period of from six to eight months.

There are many devices on the market for utilization of gas for heating purposes, the most popular being the space heater for warmer latitudes and the burners for coal boiler conversions. For heavy duty these are unsatisfactory and not recommended. A hot water boiler or hot air furnace built especially for gas should be sold and particular attention should be paid to the type of gas boiler selected.

RECOMMEND QUALITY EQUIPMENT

A boiler of high efficiency, good construction, and with safety pilot, hydrostat, and all other devices that will insure the best of service is the only one to recommend. The initial additional cost may prove a sales resistance but it will repay the prospect and the company in uniform heating and lack of service calls.

Our sales field is divided into two sections, new buildings and old buildings. The sales problem is different in each section. In old buildings we have ordinarily three factors that make our job harder. The first is the absence of proper insulation, the second is under radiation on hot water installations, and the third is discarding the old boiler which is too often looked at as a high priced piece of equipment.

More attention is being paid to insulation with materials that cut down heat loss through walls and the roof. In old houses

it is practically impossible to insulate the walls; however, the application of good insulation on ceilings and in attics will in a few years pay for itself in heating. On new houses we must work with the architect, builder and owner and sell a first class insulation job. Also, we can do much good work on seeing to it that sufficient radiation is installed. This is one of the most general sources of trouble, due to the fact that in order to cut first cost the heating job is skimped and, of course, the owner pays dearly in his future operating costs and in comfort and service.

At this point it might be well to stress the importance of working with the architects and bringing to them the fact that we really have a service that can be of benefit to them, i.e., we will check radiation and recommend thickness of insulation—but, will not change kind of insulation specified. Work of this kind spreads gas heating information and helps build good will with the architects. It is also well to work in cooperation with manufacturers of proven insulating materials and heat regulators. They will quickly recognize what you can do for them and in turn will be boosters for your service.

In preparing estimates the closest attention must be given all details. No estimate should be based on radiation installed, as this may be too high or too low; make the estimate what it should be, then check the installation and make recommendations.

House heating by gas is no longer an idea, it is a fact, and the public is interested. The cost over coal and oil is higher, varying with the rate for gas. There is this same difference in other commodities, yet there is a large percentage of our public that is willing to pay for better service.

We hear it asked from time to time: "What will happen if every home is heated by gas?" With the best rates quoted today for manufactured gas, we never will heat all homes—and if such a thing were possible, the growth would be so slow as to give us ample time to prepare. While it is true that the load is seasonal, the same holds true for other lines to a certain degree, and it would seem advisable to get this business for six or eight months at the proper rate rather than not at all. The electrical industry has rate structures that take care of this; the gas industry must come to it.

We have an unlimited field in industry and in the home, it seems to me, and a good start has been made. It is our job to work this field to the limit. It calls for technical skill, business diplomacy, sincerity of purpose and honesty in dealings. There is no place for "brass band" campaigning. Such methods have no appeal to the people in this field. Figures based on facts and results that will be beneficial to the customer as well as to the company are the foundation of a proper sales development program.

SELLS TO TEXAS CITY GAS CO.

Galveston Gas Corporation, distributors of gas at Galveston, Texas, has disposed of its holdings to the Texas City Gas Company, a subsidiary of the Union Utilities Company. The Texas City Gas Company was organized several months ago for the purpose of acquiring various gas companies within the state of Texas.

UTILITIES AD. CONVENTION

July 8-12 are dates for the Public Utilities Advertising Association international advertising convention and exposition to be held in Detroit, Mich. The convention will be presided over by B. J. Mullaney, vice-president of the Peoples Gas Light & Coke Company, Chicago, Ill.

Showing eight-inch line strung on cables over Neosho River

Suspend Line *over* Neosho River near Iola, Kan.

During the construction of a new highway bridge over the Neosho River, near Iola, Kansas, the Southern Kansas Gas Company recently was called upon for an unusual piece of engineering work. The company's line, which furnishes gas to Iola and various industries in the vicinity, formerly laid on the bridge crossing the river at this point. When the bridge was replaced it was necessary to remove the gas line and a new eight-inch line was installed on suspension cables. This work was completed in a period of eight hours, without service interruption, due to the face that the company has two other lines entering Iola from the north. J. J. Griffin is district superintendent of the Southern Kansas Gas Company at Iola.

P. G. *and* E. Additions Improve Smaller Plants

While the year's construction program of the Pacific Gas and Electric Company does not include any major building projects, there is considerable activity in the matter of increasing plant capacity and overhauling and improving equipment in many of the plants throughout the system.

San Jose gas plant now has its own private water supply, a deep well turbine pump of 1000 gallons per minute capacity having been installed. Pumping into a 30,000-gallon capacity elevated tank, the new system is ample to take care of all plant needs.

At Stockton a 160,000-foot synchronous motor driven compressor of the duplex type, automatic unloading, has been installed at a cost of $25,000. At the same plant three lifts of the storage holder are being cut down and replaced at a contract price of $45,000.

New lampblack separators, a new water supply system, and a liquid purification system are being added to the Sacramento plant. To utilize the increased production of lampblack and to increase the boiler capacity some 30 per cent, new type forced draft grates have been installed in the boiler room.

At Marysville a 75,000 Ingersoll Rand compressor, duplex 60 pound maximum, is being installed, along with yard piping and a booster, at a total cost of approximately $15,000.

A 10,000 cu. ft. relief holder is being constructed at Grass Valley at a cost of $14,000. An additional $16,000 is being expended for a new boiler, gas purifier, blower and oil heater.

At Chico, Red Bluff, Redding and Willows small installations of purifiers, water supply systems and other minor items of plant equipment are being undertaken.

OKLAHOMA STOCKHOLDERS NUMBER 40,000

There are approximately 40,000 stockholders in public utility companies of Oklahoma, including electric light, gas and telephone companies, according to a recent survey made by the Oklahoma Utilities association.

WATER GAS MACHINE BEING BUILT AT BROOKFIELD, MO.

The Semet-Solvay Engineering Corporation of New York is building a Steere Water Gas Machine for the Brookfield, Mo., Gas, Electric and Heating Company. The machine is 4 ft. 6 in. by 4 ft. 4 in. in size and will be operated with soft coal as generator fuel.

SHERIDAN COMPANY BOUGHT BY IOWA RAILWAY & LIGHT

Purchase of the Sheridan Gas & Fuel Company, Sheridan, Wyoming, by Isaac B. Smith and associates of the Iowa Railway & Light Corporation was announced early in June. Mr. Smith is president of the Iowa utility organization, which operates gas, electric, and transporattion services in 125 Iowa communities. Change in ownership of the company is thought to bring nearer the introduction of natural gas, Mr. Smith, president of the purchased Sheridan utility, having pioneered in the development of Billy Creek gas field, 56 miles south of Sheridan, and quoted in the Wyoming press as favoring laying of a pipe line to bring Billy Creek gas to Sheridan.

Directors of the new company are Isaac B. Smith, J. F. Sorensen, J. M. Drabelle, and Sunderlin Dow, all of Cedar Rapids, Iowa, and George G. Belt of Buffalo.

SO. OREGON POWER CORP. HAS LOWER COOKING RATES

Effective June 11, rates on gas for cooking purposes on the system of the Southern Oregon Gas Corporation were lowered 13 per cent. The gas company applied to the state public service commission for the reduction. Grants Pass, Roseburg, Medford and Ashland will be affected by the new rates.

Using Fewer Distribution Dollars

the atmosphere which in turn prevented cracking of the cast iron pipe. This modern method is now being successfully used and the details are available for those who are interested.

SERVICE INSTALLATIONS

Service installations also afford opportunities for modern methods. Although the pipe sizes involved are comparatively small, the lineal footage is considerable, so a small saving per foot will bring a total well worth considering. Every building should be visited by an inspector before the service is run so that a satisfactory meter location can be obtained and the size of piping selected. These pipe sizes for services should also be calculated rather than selected by guess.

By providing the inspector with a table showing the capacities of the various sizes of pipe used on services, the selection is simple. With the aid of this table the inspector has only to step off the length of service, estimate the load, and the table will show the size of piping necessary. In estimating the load it must be remembered that the domestic consumer very seldom uses all the appliances at once and it is, therefore, unnecessary to build to meet this requirement. Some companies have in the past established 1¼-inch or even 1½-inch pipe as a minimum size for service pipe. The reports of load factor committees will show that this size is quite unnecessary to supply the average consumer, and to follow such a practice is needlessly building up the capital account. Length of pipe influences the discharge and each case should, therefore, be considered individually

The practice of brazing service connections to steel mains is now so generally accepted that the use of service clamps for this purpose is no longer necessary. This brazing has in most cases been done with compressed natural gas instead of acetylene, as the lower flame temperature suggested greater safety. This, however, has meant a slower job and as the welder is in a rather small hole, the fumes are objectionable. For this reason some companies are now welding instead of brazing, and on standard weight pipe where the pressure does not exceed 60 pounds the danger is very slight as the torch would have to be held on one spot for a longer period of time than it takes to make the weld. With larger size connections, even under extreme pressures the weld may be safely made by using the electric arc weld. One welding company has been doing this kind of work on oil company pipe lines carrying around 500 pounds pressure and on gas lines under 200 to 300 pounds pressure.

Some saving may be effected on service installation by keeping the width of the trench down to a minimum.

This can be accomplished by the use of narrow blade shovels having a blade width of six inches instead of the standard width. Boring under pavement instead of trenching the entire length will also prove a saving as well as having the additional merit of helping maintain friendly relations with municipal authorities.

SELECTING METER SIZES

Meter sizes on domestic sets can be selected by the inspector at the time of making the estimated load for service size. The same care must be used in the choice of meter size as in the selection of service size, as in most cases it is needless to install for

(Continued from Page 27)

100 per cent of the load. Meters for large industrial consumers should be of the positive displacement type unless the loads are in excess of 20,000 cubic feet per hour. Over this amount orifice meters may be considered, as they offer larger capacity for a minimum capital investment. For loads of less than 20,000 per hour orifice meters are not economical, for the daily cost of collecting and computing the charts is hardly less than 50c per meter, which would mean an operating charge of $172.50 per year. This would more than pay for the interest charges on the investment in displacement meters, which would cost about $650.00 for this capacity.

Maintenance work in many companies has been heavy the past few years due to extensive street paving programs which necessitated the overhauling of mains and services. Where steel mains are to be cleaned and given a protective coating the sand blast offers an economical and effective means of cleaning the pipe. The paint must be applied immediately after blasting, as the cleaned surface becomes quickly oxidized if left exposed to the atmosphere. Service clamps should be removed and couplings welded in place while the main is uncovered. This can be accomplished by driving a steel pin into the taphold and holding it with a special clamp. The service clamp is then removed and the coupling slipped over the pin and down the original hold where it is welded in place. The pin is then removed and the service reconnected.

Street paving programs often bring requests for the company to install services to vacant lots so that future cutting of pavement can be avoided. This should not be done at company expense as it will load up the capital account with non-producing property and will in time be reflected in the rates, with the existing consumers virtually paying for the readiness to serve vacant lots. If the installation of service to vacant lots is desired, the cost should be paid for by the owner of the lot supplied, with an arrangement to refund this cost if the service becomes productive within a reasonable period of time.

REDUCING UNACCOUNTED-FOR GAS

Unaccounted-for gas demands a certain amount of maintenance, but the larger the system the harder it is to check the results obtained. Where district regulators are used it is profitable to isolate the areas supplied by them and meter the gas fed into them. Each isolated area then becomes a small distribution system in itself and the unaccounted-for gas can be carefully watched. Then, when the loss passes a certain amount, determined by the cost of the gas, a leakage survey can be carried on in the area.

Operating activities bring the distribution employees in contact with the public and are therefore very important. The old practice of denying service to the consumer past the meter outlet is out of date. We should make appliance adjustments and clear house lines gratuitously and leaks in house lines should be located without hesitation. The modern method here is to recognize the fact that the consumer depends on us and we must keep a watchful eye on our product even up to the point where the products of combustion pass up the flue. If we shirk our responsibility here we cannot hope to perpetuate our business, as the dissatisfied consumer will turn to the first competitor with an attractive offer.

New ideas and new methods are being constantly developed in other businesses. We should carefully study any improvement offered to other industries to see if it can be applied to our own. We must be constantly on the alert for new methods and welcome them rather than frown at their suggestion, for if we allow the hand of tradition to hold us back we cannot escape the old law of the survival of the fittest.

Lone Star Repair Shop Has Many Departments

A BUILDING 112 feet by 180 feet in dimension, housing a complete auto repair shop, meter and regulator shop, machine shop and central warehouse, has been completed by the Lone Star Gas Company, Dallas.

The building has been constructed to take care of the large volume of rebuildng and repair work necessary to the proper maintenance of the equipment operated by the company.

The garage department, which is equipped to completely rebuild every unit of the automobile, contains a special paint room, a battery department, a wood-working room and a top and body repairnig department, as well as storage space for twenty automobiles.

A feature of the meter shop is a specially made grinding machine for regrinding valve seats on large capacity positive meters while bolted in place on the valve plate.

This department also has a very accurate 100-inch water column for testing orifice meters and dead weight testers for test gauges and static tubes. Another feature is a brick-walled prover room with thermostatic control containing a 20-foot prover for testing large capacity meters.

The machine shop is equipped to do all types of work on compressor engines. This department has a $5,500 lathe which will be used in general machine shop work and on the larger compressor engines. The plant is equipped with a 110 H.P. Bruce McBeth gas engine, connected with a large capacity generator which will furnish current for the individual motors in the machine shop.

MERCO-NORDSTROM VALVE CO. APPOINTMENTS

Announcement is made of the appointment of Roger Bowman as manager of the Cleveland office of the Merco Nordstrom Valve Company. Mr. Bowman will be in complete charge of the Cleveland territory.

New offices of the Merco Nordstrom Valve Company are also being opened in Boston and Dallas, the Boston office to be located at 184 Boylston St. and the Dallas office in the Magnolia Bldg.

FORT MADISON PLANT ADDS EQUIPMENT

Semet-Solvay Engineering Corporation of New York has received an order for new blast piping and a quantity of pipe, fittings and valves for the plant of the Fort Madison Gas Light Company, Fort Madison, Iowa. The company recently installed a six foot Steere Water Gas Machine. All pipe is of standard Steere welded construction.

Announce More Additions *for* B. C. Electric

FURTHER particulars regarding the equipment of the new gas plant and gas holders of the British Columbia Electric Railway Company, together with additions to the original construction program have recently been announced by John Keillor, gas engineer for the company. Contracts have been let by the gas department for a water gas plant with a capacity of three and one-half million cubic feet per day; for a tar extractor with five million cubic feet capacity per day; a 30-inch station governor; a battery of purifiers of two and one-half million cubic feet daily capacity; two 125,000 cubic feet per hour exhausters, one electrically driven, and one steam driven; a waterless gas holder of three million cubic feet capacity; a sulphate of ammonia plant with a daily capacity of two tons; and a gas driven booster of 250,000 cubic feet capacity per hour.

The water gas plant of Humphreys & Glasgow type will be the first of its kind in Canada and will be in two units, each 1,750,000 cubic feet capacity per day, using coke. They will be mechanically operated, and completely equipped with revolving self-clinker grates, water jacketted generators, self charging apparatus, back run and waste heat boilers of the self steaming type.

The water gas units will be installed at the east end of the Keefer Street retort plant, Vancouver B. C. Coke will be tripped off the vertical retort conveyor to the overhead coke hoppers and mechanically charged into the self-clinkering generators.

The clinker, reduced to less than three per cent carbon content, will be mechanically discharged from the revolving grates into buggies for conveyance to the ash pile.

The three million cubic foot waterless gas holder, to be erected on the Carrall street site, will be the second of its type in Canada, the Consumers Gas Company of Toronto having erected one a year ago of four million cubic feet capacity. The holder will rise 250 feet above the ground and have a diameter of 140 feet. When put in commission it will supply gas to all the business and west end of Vancouver, and increase the storage capacity.

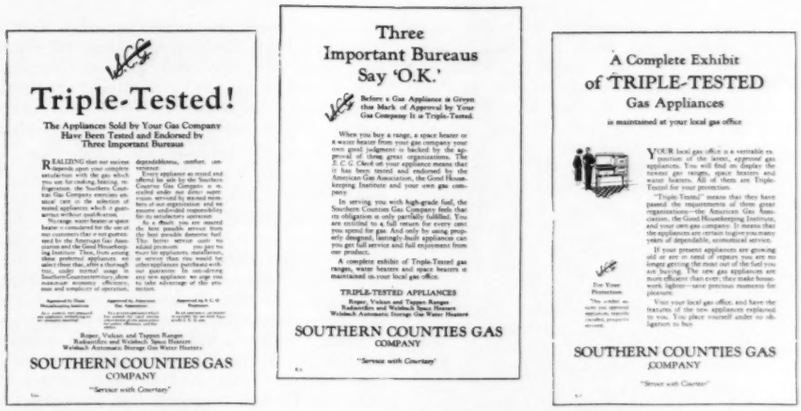
The water gas plant, two exhausters, one of the rotary meters, the tar extractor, and the sulphate of ammonia plant will be erected on the Keefer street gas works' site. The gas driven booster will augment the existing booster plant at the Grandview station holder. The gas holder, battery of purifiers, one rotary station meter, and the 30-inch governor will be erected on the new gas works site on Carrall Street. Units to be erected on this site will form the nucleus of a new gas plant with an eventual capacity of 20 million cubic feet per day.

MATTISON AT BISMARK

O. W. Mattison is now in charge of the Bismark, N. D., properties of the United Public Service Company. Mr. Mattison was formerly with the Missouri Power and Light Company, and last year was vice-president of the Missouri Association of Public Utilities.

PARIS OFFICE

The Cities Gas Company, which recently purchased the gas franchise at Paris, Texas from the Texas Power and Light Company, has established offices at 40 South Main St. of that city. The company also owns franchise in Galveston, El Paso, Waco and Brenham.


Triple-Tested!
The Appliances Sold by Your Gas Company Have Been Tested and Endorsed by Three Important Bureaus
SOUTHERN COUNTIES GAS COMPANY
"Service with Courtesy"
Three Important Bureaus Say 'O.K.'
SOUTHERN COUNTIES GAS COMPANY
"Service with Courtesy"
A Complete Exhibit of TRIPLE-TESTED Gas Appliances
is maintained at your local gas office
SOUTHERN COUNTIES GAS COMPANY
"Service with Courtesy"

This series created confidence in approved gas appliances and in the gas company which sold them

Advertising that Pays

(Continued from Page 21)

This year, for the first time, our company is using an intensive direct advertising campaign as a tie-in with our newspaper display. The direct-by-mail campaign consists of a series of three pieces; first an attractive 16-page booklet entitled *"Getting the Best that Gas Can Give You,"* followed four days later by a two-color, four-page letterhead on "Triple Tested" appliances in general, and the third piece of mailing is another four-page letterhead printed in three colors, dealing with the particular major appliances that the prospect needs.

We have a "Service Survey Card" system which charts every one of our consumers and gives the sales department information as to the type, kind and condition of all gas appliances in the consumer's home. The service men, the turn-on men, and complaint men fill in these cards during their regular day's routine work. From these survey cards we obtain a really live prospect list. The exact condition of the appliance is tabulated—also, whether the appliance is "old," "medium," or "new." A special classification is made for "range," "water heater," "heating plant," "fireplace," "refrigerator," and "space heater."

Under "range," we have "oven control" and "hot plate." Under "water heater" we have "automatic," "storage," "tank" and other equipment, and so on down, each classification being sub-divided.

This information comes to the sales department and after passing through certain routine, in the head office of each district, the prospect is sent the three direct mail advertisements and then the salesman makes a personal call to complete the sale.

Advertisement No. 1 is the "Service Manual" or "Handbook of Helpful Suggestions for the Housewife," as it is called. This 16-page booklet is designed to build up goodwill for the gas company, to impress the housewife with the service offered free by the public utility, and with the correct use of gas as a fuel. The cover design is printed in two colors on a dark brown stock of high grade book-cover paper, attractively laid out.

This booklet contains valuable pointers on the most economical use of gas. It is a help to the consumer in getting more satisfaction in the use of gas and in possibly cutting down the size of her gas bill. "Twelve simple rules for saving gas" are given, as well as instructions on "How to Read the Meter." The consumer is told "How to Get Better Results from Her Gas Range" and "How to Adjust the Burners on the Range." "How to Get Better Results from Your Water Heaters" is another topic discussed, and suggestions for the proper care of water heaters are given.

A "Convenient Cooking Chart" is printed in this service manual, which increases the value of the booklet to the housewife. The chart is simply arranged, foods being listed alphabetically with the right temperature and cooking time accurately worked out in Southern Counties Gas territory under actual kitchen conditions by our Home Service Department.

Another page is devoted to the "Use of Our Home Service Department." "House Heating" and "Various Forms of Independent Heating Units" are also included in the booklet.

After building up prestige for the gas company, we tell the consumer about "triple tested" approved appliances for her protection, emphasizing the three important bureaus that have endorsed these gas appliances. Then we talk about "guarantee" and the assurance that the appliance when purchased will be expertly installed.

On the next page we tell the prospect about the "S.C.G. Triple Tested Easy Payment Plan." This done, we felt that we could show her pictures of gas appliances that were "Triple Tested." A full double-spread is used, illustrating an example of a range, water heater, space heater and unit floor furnace, all carrying the S.C.G. Triple Tested "check."

No attempt was made in composing this service manual to directly sell any specific gas appliance handled by the gas company, but merely to inform the prospect.

A letter is sent, accompanying the booklet, calling attention to the contents of the handbook and suggesting that after reading it, she hang it in the kitchen where it can be referred to regularly. A hole is punched in the upper left hand corner and each book has a brown cord attached, making it convenient for the housewife to hang up.

Direct-by-mail advertisement No. 2 is a four-page broadside, the inside of which is devoted to "Triple Tested" merchandise in general, but on no specific type of product. An illustration of the "Certificate of Satisfaction" is shown and also a picture of a range, water heater, space heater, unit furnace and gas refrigerator. (Mention is made that the A.G.A. tests on refrigerators has not yet been undertaken.)

Still no attempt has been made to sell

the prospect our merchandise. We have tried to impress her with the quality products endorsed by her local gas company and inform her that a complete line of these gas appliances is on display at our office.

Now we are ready for the big smash! In direct-mail advertisement No. 3, which is another four-page broadside in three colors we show her the particular appliance for which she is in the market. We have sold her on the idea of "Approved" gas appliances in general and now we sell her on the specific product carried by our gas company, which we know she needs. There are three separate advertisements No. 3, one specifically on ranges, one on water heaters and one on space heaters, and on the first page of each is a multigraphed letter dealing with ranges, or water heaters, or space heaters, depending on the individual prospect's needs.

For example, let's take a prospect for a gas range. She is mailed a booklet with a letter calling her attention to the same. Four days later she receives a four-page letter, on the front of which is a multigraphed letter, personally filled in with her name, address and salutation, and dealing with ranges in general. The inside impresses her with the "Triple Tested" appliances carried by the gas company and shows a picture of a gas range along with cuts of other approved products. The next letter deals with gas ranges and the inside of this broadside shows her three kinds of standard gas rnges sold by us. The qualities of each are individually written up and she is told about the easy terms, etc. Price has not been discussed at all.

The salesman then calls on the prospect and endeavors to complete the sale.

The same applies to prospects for water heaters and house heating. A further advertising medium used by the Southern Counties Gas Company is that of window and floor displays changed continually to coordinate with the advertising campaigns and sales campaigns. Posters and display cards are furnished each office frequently.

On each individual appliance we have attached a yellow "Triple Tested tag with printing in red. Again we register with our major theme of "Triple Tested" appliances.

You can readily see that after the housewife has read about the "Triple Tested" products in the daily and weekly newspapers, received three direct mail pieces dealing with "Triple Tested" merchandise and then walks into the gas office to pay her monthly bill and is confronted with "Triple Tested" tags on the appliances and posters in the windows and on the display floors, she is certain to remember when she needs gas appliances, that her local gas company sells the best products money can buy.

As for results from this direct mail campaign, we are getting better than 10 per cent sales, figured over the last three months, since the inception of the campaign. It has materially increased the salesman's commissions. Our floor sales have also increased noticeably. Many prospects are walking into the offices to purchase a gas range or other appliance after receiving only the first letter. Some even bring the letters with them.

Such results are incontestable evidence that advertising, carefully planned, well organized, and definitely followed up will measureably increase sales results. The sales department and advertising department must cooperate, and cooperation, here as in so many other fields, is the keynote to success.

Pioneering *in* Use *of* High Pressure Distribution

(Continued from Page 23)

less than 12 hours and usually 24 hours, and a chart is taken showing the actual recorded pressure in the pipe. This test is well above the working pressure, usually about 70 pounds; after the line has had plenty of time to adjust itself as to temperature conditions, the pressure is noted and again noted at the end of six hours and if the drop is greater than one-half pound the line is again carefully gone over and the test repeated until such time as it will stand the specifications as set in the one-half pound drop.

Our welders are not high priced men, but men picked out of our organization after a careful study has been made of their drips, hence careful grading and an overhead weld every 400 feet. All welding was done on top of the ground to eliminate excessive pumping, then the pipe was lowered by digging the sand from beneath it until the actual elevation, previously determined, was reached. On account of the proximity of the lake and the shifting sand, it was deemed advisable to give this pipe more protection and support than is usually given the pipe lines; this was done by means of 30-foot piling driven in pairs every 30 to 60 feet, tied together with cross timbers, thus forming a hanging pipe line. With this procedure our troubles did not cease. As buoyancy of pipe line (on trial) raised the piling, the floating pipe was weighted down with wooden mats covered with sand. At the points where drips were necessary, these and these only were protected by sheet piling.

character, ability, stability. We believe that men who are employed as welders should be given a marked consideration and greater latitude than for example, ditch diggers. The welder cannot do his best work if he is subject to petty annoyances, and for that reason we do not attempt to drive our welders. If we find a welder who cannot keep pace with the rest, at the first opportunity we place him on some other work rather than attempt to drive him, or disturb the other welders by discharging him.

Welding equipment is always kept in the best possible shape, leaky or fluctuating gauges or faulty torches might be the cause of a joint failure; as a precaution against delay, spare equipment is always held in reserve so work may go on while defective instruments are sent to the factory for repairs. We never attempt to make our own repairs, feeling that the manufacturers are better equipped than we are in the field.

The following are the figures averaged over the last three or four years, derived from actual field practice, taken over jobs good and bad, long and short, the costs also including the service, all help necessary for the lining up and turning of pipe, as well as for welders and materials used.

4" Joints—Labor and Material	$1.17
6" Joints—Labor and Material	2.61
8" Joints—Labor and Material	4.14
16" Joints—Labor and Material	4.40

No bends are made greater than 45° and on all over 22½° provisions are made for reinforcing either by straps or braces, depending on the service required.

During our short experience in welding of pipe lines, numerous interesting problems have developed. One 16-inch line completed during the past year is an outstanding example. This line, which is 8000 feet in length, is a semi-high pressure line connecting two of our plants; about 5000 feet of this extension is laid along the bank of Lake Michigan, varying from 30 to 100 feet from the water's edge and well below low water level. The nature of the line meant drips, hence careful grading and an overhead weld every 400 feet. All welding was done on top of the ground to eliminate excessive pumping, then the pipe was lowered by digging the sand from beneath it until the actual elevation, previously determined, was reached. On account of the proximity of the lake and the shifting sand, it was deemed advisable to give this pipe more protection and support than is usually given the pipe lines; this was done by means of 30-foot piling driven in pairs every 30 to 60 feet, tied together with cross timbers, thus forming a hanging pipe line. With this procedure our troubles did not cease. As buoyancy of pipe line (on trial) raised the piling, the floating pipe was weighted down with wooden mats covered with sand. At the points where drips were necessary, these and these only were protected by sheet piling.

ANNUAL REPORT OF PUBLIC SERVICE CO. OF COLORADO

The annual report of the Public Service Company of Colorado, show current assets double current liabilities, with earnings over four times preferred stock dividends requirements.

Total assets of $82,213,487, of which $5,442,082 are current and $72,906,657 are plants and equipment are shown in the balance sheet as of Dec. 31, 1927. Surplus at the close of the year totaled $3,845,749.

Gross earnings for the year were $11,372,-974. A deduction of $6,655,220 for operating expenses and taxes left a net income of $4,717,725. The addition of $115,783 for non-operating income brought the total up to $4,833,509, which is equal to more than 2¼ times interest requirements on the entire funded debt. The balance after provision for these charges, was 3.99 times dividend requirements on the preferred stock.

IMPROVEMENTS IN GAS DEPT. OF SAN JOAQUIN UTILITY

Expenditures aggregating $50,865 will be made on the gas system at Bakersfield, California, operated by the San Joaquin Light and Power Company. This figure covers cost of 14,300 feet of additional six-inch high pressure transmission lines. In Merced, California, the same company will install new gas sampling equipment. New meters and services in the Bakersfield gas department will call for $65,292 and in Merced $4,500. At Selma the company will expend about $2,250 for connecting new customers.

BEAUMONT PERSONNEL REMAINS WHEN DIXIE BUYS

H. P. Carroll who was manager of the Beaumont, Texas, division of the Southwestern Gas and Electric Company, was retained as manager when the Beaumont Division was recently purchased by the Dixie Gas & Fuel Company. The other employees of the division were also transferred to the Dixie Company.

BYLLESBY ENGINEERING DEPT. GETS MORE SPACE

An additional 25,000 square feet of space in the Banker's Building, Clark and Adams Streets, Chicago, has been leased for the engineering and construction department of the Byllesby Engineering & Management Corporation, according to H. W. Fuller, vice-president in charge.

Analysis *of* Natural Gas *and* Natural Gasoline

(Continued from Page 22)

cost. Analysis of the gas would enable the plant to be designed on this basis instead of the customary manner, where the design is more or less a matter of good judgment on the part of the designer.

Knowledge of the composition of the gas would facilitate the design of absorbers and give more exact information on the number of plates necessary in the absorber and the quantity of absorber oil circulation needed to efficiently extract the desirable constituents from the gas. (The recent article by Dr. W. K. Lewis[1] on absorber design clearly indicates the great advantage of knowing the chemical composition of the gas to be treated.)

Analysis would make possible the correct design of stills and columns for controlling the endpoint of the gasoline produced.

Analysis would facilitate the design of rectifying columns for separating the undesirable constituents of the gasoline extracted from the desirable constituents, and would enable the definite design of compressor installations for plants utilizing the compression process of extraction.

EQUIPMENT EFFICIENCY

For plant operation, analysis would be, perhaps, even more important than for plant design. The efficient gasoline plant should extract all of the Group 3 hydrocarbons (pentane and higher) contained in the gas which it is economically possible to extract. In order to accomplish this end, it is necessary to extract more of the Group 2 hydrocarbons (butanes) than can be utilized in the finished product. Likewise, it is necessary to extract a considerable amount of the Group 1 hydrocarbons (propane, etc.) which are not desired at all in the finished product.

How do we determine today that this end has been accomplished? We do it by means of a number of different empirical tests, perhaps the most general in use being one of the many forms of charcoal test. Suppose a plant dry gas is tested by means of the atmospheric charcoal test and found to contain .06 or .08 gallon of "gasoline" per 1,000 cubic feet treated. What does this .06 or .08 mean? As the condensate from a charcoal test, it means nothing but a certain amount of liquid whose volume enters into the test calculation in such a manner as to yield the numbers .06 or .08. What is this liquid, is it butane, or pentane, or hexane? Does this give any positive information which is so desirable? It is to be feared that even the most optimistic will agree that it does not.

Fundamental analysis has shown conclusively that the charcoal test, no matter how it is made, does not furnish definite information as to the amount of pentane and higher hydrocarbons left in dry gas. Dry gases giving the same gasoline content by the charcoal test will show varying percentages of pentane and higher hydrocarbons by fundamental analysis. In a great many instances it would be possible to remove from 5 to 10 per cent more of this fraction from the gas under economic conditions, made possible by exact chemical control.

Immediately the question arises as to whether or not it is desirable to extract more gasoline from gas when it is not known what to do with the gasoline extracted under present conditions. This question can be answered by stating that the aim should not be to extract more gasoline from the gas, but to extract more of the desirable constituents of gasoline from the gas, and, later on in the process, by rectifying the gasoline produced, eliminate the undesirables and have a finished product which is more desirable, and therefore more easily marketed. The only way to tell whether or not the desirable constituents have been completely removed is by analyzing the dry gas leaving the absorbers. In other words, absorbers and all other equipment should not only be designed, but should be operated according to fundamental analysis—not estimation. Would it not be advantageous to develop an analytic method, which would make exact control possible?

Equipment efficiency is usually expressed as an increase in production of gasoline—what kind of gasoline, whether wild or stable, not being stated. Who can estimate the millions of dollars of plant equipment in the form of absorption towers, stills, etc., which have been thrown into the junk pile for no other reason than a haphazard substitution of new equipment for old in an endeavor to improve extraction, with no scientific means used to determine beforehand whether the result would justify the expenditure?

The governing factor which controls the size, and consequently the cost, of the majority of the equipment used in extracting gasoline from gas is the absorber oil circulation. The quantity of oil to be circulated is one of the first things that must be decided upon, and this factor controls the size of pumps, the size of lines, heat exchange apparatus, stills, cooling apparatus, and so forth. If the plant is properly designed, the oil circulation will be so proportioned that it will extract from the gas the maximum economical percentage, as stated previously, of the Group 3, or pentane and higher hydrocarbons.

The design, however, is based on the assumption that the absorber oil delivered to the absorbers will be completely stripped of the lighter gasoline hydrocarbons in the still. If the absorber oil is not completely stripped of these hydrocarbons the efficiency of absorption is decreased, and in a plant operating at full capacity the efficiency of the entire plant is lowered. Consequently it becomes an important matter in operating a gasoline plant to operate the still in such a manner that the absorber oil returning to the absorbers will be completely stripped. How is it possible to determine when this has been accomplished?

Many methods are being used to make this determination. Chief among these are, perhaps, the vapor pressure tests made on the stripped absorber oil, and Engler and Hample distillations of the oil to determine the percentage of lighter constituents contained therein. It is true that these methods give a rough approximation of the condition of the oil, but the information obtained by them is much too indefinite to be used as an important method of control in plant operation.

Another point is the use of vent tanks for venting enriched oil before distillation. Is it not important to know the composition of these vapors and the loss of Group 2 and Group 3 constituents? A method of analysis would unquestionably result in a positive control of these factors.

RECTIFIED GASOLINE

In the operation of a gasoline plant today it is necessary, if it is desired to produce a finished product which will meet with a ready market, to rectify the plant make in order to make a sharp separation between the hydrocarbons which are desirable and those which are undesirable in the finished product. The manufacture of rectified gasoline, or gasoline which contains the minimum percentage of the Group 1, or undesirable, hydrocarbons, and a proper concentration of Group 2, is becoming more and more necessary every day. In fact, the future stability of the industry depends to a great extent upon the production of a product of this nature which can be utilized by refiners in the manufacture of finished motor fuel.

The rectification of the plant make is accomplished in various ways by the use of rectifying or fractionating columns. There is no way to tell when the column is operating efficiently without recourse to analysis. The analysis of the gasoline produced by the use of the column is not sufficient inasmuch as it is necessary to know that none of the desirable hydrocarbons are being rejected from the top of the column along with the undesirables. Tests other than analysis do not give any information of value in this connection.

ANALYZE FINISHED PRODUCT

When the plant has finally produced the finished product, how do we know that it meets the requirements of the refiner who is to use it in blending? We may determine the gravity of the gasoline; we may determine its distillation range by means of the Engler distillation, and we may determine its vapor pressure. None of these methods, however, are of any value in determining its composition. According to published data of Doctor Brown[2], the presence of propane, and perhaps certain other undesirables, in gasoline is one of the contributing factors in causing the "gas lock" in carburetors when the gasoline is blended into finished motor fuel. It is impossible to tell by vapor pressure, or the other methods, whether or not the gasoline contains propane, inasmuch as a gasoline containing 2 per cent of propane may have a vapor pressure of, say, 12 pounds at 100 degrees Fahrenheit, and another gasoline may contain no propane and still have a vapor pressure of 12 pounds at 100 degrees Fahrenheit, due to the inclusion of a greater percentage of butane.

Gasoline today finds its major use as a component of motor fuels. The refiner has long been prejudiced against the use of large quantities of gasoline in the motor fuel which he turns out, primarily because of previous experiences with gasolines containing high percertages of undesirables. Manufacturers have determined for the refiner that the presence of these undesirables limits the amount of gasoline which he may use in his finished product. Now that this has been discovered, it is up to all the manufacturers of gasoline to turn out a product which does not contain these undesirables. Suppose this is done. It is not enough to be satisfied that the gasoline does not contain undesirables, but the manufacturer must be able to prove definitely to the refiner that they have been eliminated. The point for serious consideration is that if the maximum of what is desirable in gas can be recovered with a minimum of equipment; a positive check kept on plant operation, and the production of an undesirable free gasoline of sustained quality which will make possible a cordial trade relation between manufacturer and refiner, is this not a justification of the commercial value of such methods?

Work has been done by various experimenters toward developing these all-important analytic methods. From available information, meager though it may be, let us venture into this field and see what the possibilities are. Anderson and Erskine[3] in 1924, resolved gasoline quantitatively into its higher components, by a method of fractional distillation, beginning with pentane. The disappointing part about their work is that they did not study the constituents which interest us vitally, namely: Propane, isobutane, or butane.

Hill-Henderson & Ferris[4] made an indirect study by modifying a method of examination suggested by Cross[5] by fractionating two liter samples through a 5-foot column. Their results are interesting in that the samples of gasoline analyzed were from Pennsylvania, Oklahoma, and California, and all indicated marked deviation from the paraffin hydrocarbons. However, their results are empirical although from a fundamental angle, possibly the low boiling fractions of different petroleums are not essentially paraffins as suggested by Doctor Brooks[6] which would serve to stimulate suspicion as to the nature of gas and gasoline.

DR. BURRELL'S METHOD

Doctor Burrell's work on low temperature pressure analysis of natural gas has been a stimulus to certain investigators to apply the idea to gasoline. Briefly, Burrell's method[7] is based on the relation between the vapor pressure of the component sought, and the undesired component. From the vapor pressures of the paraffin hydrocarbons, at low temperatures[8], temperatures were chosen where the vapor pressure of the desired component was in evidence, and that of the undesired component as low as possible. According to this method, and the Shephard-Porter modification[9] butane is separated at —90 degrees Centigrade. Ryan transferred the gasoline by means of a burette into a graduated tube held at a temperature of —90 degrees Centigrade, and by opening a stopcock from this tube to a second tube held at —183 degrees Centigrade with liquid air, the butane was transferred by temperature difference and the percentage computed from the residue in the graduate tube. This method is primarily for determining the butane content of rectified gasoline, so is limited in application without modification, no account being taken of the undesirables.

A western concern worked along the same line, but attempted to make the method adaptable to all types of condensates, such as liquids from high-pressure accumulators, tray samples from rectifiers, unrectified gasoline, etc. Their work revealed aggravating conditions which were so slipperv that work was abandoned. Vapor pressure indications were unstable and analyses were made where butane was expected at —90 degrees Centigrade and the condensate which was obtained consisted of from 10 to 40 per cent of something heavier than butane.

Another method of gasoline analysis is that of high pressure, ordinary temperature rectification. The principle of separation being the same as for the large scale high-pressure rectification of natural gasoline, with the vapor pressure curves of the different paraffin hydrocarbons[10] used as a control. By this method, the gaseous fraction of unrectified gasoline has been separated as a lump, but reanalysis has not yet given satisfactory results. Most important of all, qualitative proof is lacking.

A third method which holds tempting possibilities is the low temperature rectification, all-glass apparatus, with a slender fractionating column, possibly of the Dufton[11] type. Next, let us take natural gas analysis.

The principle of the Burrell separation has already been mentioned under gasoline analysis, but the earlier form of apparatus is not prominently in use.

The Shephard-Porter modification of the Burrell method was an effort to speed it up for the purpose of commercial analysis and the preparation of pure hydro-carbons. Attempts by a western company to analyze California gas by this method have been met with difficulty. Vapor pressure values seem to deviate for the compounds sought in spite of many vaporizations to remove the last traces of the previous fraction, this deviation assuming large proportions for the cuts for ethane, propane, and butane, and from the fact that so many vaporizations are made it leaves a suspicion—namely, the presence of ethylene, propylene, cyclopropane, and butylene. Another curious phenomena is the generation of crystalline formations in the distillation tubes. Last of all, engineers do not obtain a quantitative balance in their calculations, using analytic figures obtained.

Another method of analysis, concerning which no data are available, is that of attempting to fractionate natural gas by a tube of activated charcoal at low temperatures by means of a thermogradient.

From what has been mentioned, it is evident that there are many ways of going at the problem. Progress seems to have been made by different concerns in the development of fundamental analytic methods, but it is impossible to determine the status of these efforts due to the unfortunate attitude of secrecy. Most of these have been developed at considerable expense by individual companies, probably each one incorporating some feature considered by its sponsors to solve the problem; therefore they naturally hesitate to make this information available to others who have not shared the burden.

However, recent comparisons of the results of tests made by different individuals and companies invariably show that existing methods leave something to be desired. Analysis of the same gas by different methods in use by different companies does not give the same results. Inasmuch as only one result can be correct, it follows that some of the methods of analysis now in use are not as accurate as they might be. The reason for these discrepancies may be due to a multiplicity of viewpoints, both technical and commercial, which can only result in confusion and be a means of retarding development, whereas by getting together and attacking the problem of gas and gasoline analysis collectively, the ultimate solution would be hastened and the industry in general benefited thereby.

GAIN REFINER'S CONFIDENCE

Suppose manufacturers all develop methods of analysis individually and keep them secret, they would still not be able to convince the refiner that they were turning out a product which he should use. Before they are going to meet with very hearty cooperation in this respect from the refiner it will be necessary to develop methods of analysis which can be used by all, including the refiner himself for determining the character of the gasoline which is delivered to him. There are comparatively few businesses today in which raw or finished materials are purchased entirely on the manufacturer's representations, and there is no reason why we should expect the refiner to accept our statements with reference to natural gasoline, unless he is in a position to verify them and reach his own conclusions. To the refiner, natural gasoline is only an accidental in his operations, but to the manufacturer it is a matter of life or death, and it is therefore very important that a method of analysis be developed by means of which all concerned can reach their own conclusions.

Perhaps it will not be necessary to develop a method of analysis which will enable us to identify each hydrocarbon separately. It may be sufficient to develop a test which will enable us to identify the hydrocarbons falling into the different groups enumerated heretofore. The solution of this depends upon all concentrating on the development of methods of analysis cooperatively.

THE COMING BY-PRODUCT FIELD

All indications point to the fact that the gasoline manufacturer is, in the future, going to be forced to develop the by-product market. There are countless uses for the components of natural gasoline. Unfortunately we cannot wait until somebody else finds out what these uses are for us. We will have to develop these markets of our own accord. In order to do so rapidly and thoroughly it is absolutely requisite that we have accurate knowledge as to the composition of natural gasoline.

Suppose one of the companies now having a method of analysis has a more accurate method than any of the others, it would have little if any chance of profiting financially by the possession of such a method, from the by-product angle. On the contrary, products turned out by such a company could immediately be duplicated by other companies by the simple expedient of obtaining an Engler distillation of the product. They could then place on the market a product which met the distillation specifications but which would perhaps be an inferior product, and in this manner possibly bring into ill repute the product of the first manufacturer.

Supposing we have fifty and one different ways of analyzing gasoline, how will we ever prove to the refiner that it is possible for him to have compounds in his own product that will exercise as deleterious a property as propane, or isobutane, without any natural gasoline present, if we are at variance concerning our own fundamental concepts? Surely he will be skeptical of our statements if we cannot prove them collectively.

These factors, with hosts of others untold, should jar us into the realization that the time is long overdue when we should know the scientific "why" of our raw material and product, and collectively agree upon it. We should educate ourselves, through co-operative research, to know what we must know fundamentally in order to make commercial operations exact, and as profitable as possible.

It is evident that natural gas and gasoline technology must be expanded and improved to meet future conditions, and be able to interpret what commercial research develops. Undoubtedly many present know that physicists at the Norman Bridge laboratory of the California Institute of Technology are about to attempt a method of gasoline analysis[12] by means of a principle[13] which consists of bombarding the structure of gasoline with minute negative electrical particles called electrons—this phenomena being termed "ionization." The gasoline fractions, which have become positively ionized by means of this electrical bombardment will then be passed through a powerful curved magnetic field in the form of what is termed a "positive ray." This positive ray is then broken up into what is called a "mass spec-

trum" and each constituent determined with great precision electrically. This work is mentioned to show that scientists are hammering away at the problem, too. If the mass spectrograph should be successful, we will then have a scientific eye which will pierce the outward form of fuels and study their internal structure. Therefore, as an important part of the petroleum industry, let us be prepared technically to realize commercially to the fullest extent what scientific research may give us.

This rough panoramic view of this vitally important problem may serve to stimulate thought on the question. Let us attack it as a body. Natural gas and gasoline should be resolved into their components and studied intensely by each manufacturer in order that he may successfully solve the conditions peculiar to his individual problems—with science as a servant rather than a mystery.

[1]Chemical and Metallurgical Engineering, Vol. 35, No. 2, pp. 93-95, February, 1928.
[2]Proceedings California Natural Gasoline Association, November, 1927, pp. 32-63.
[3]Industrial and Engineering Chemistry, Vol. 15, No. 3, pp. 263-267, March, 1924.
[4]Industrial and Engineering Chemistry, Vol. 19, No. 1, pp. 128-130, January, 1927.
[5]Kansas City Testing Laboratory Bulletin No. 19 (1925).
[6]Chemistry of the Non-Benseneoid Hydro-carbons, Dr. B. T. Brooks, p. 16, (Chemical Catalog Co. Pub.).
[7]United States Bureau of Mines Technical Paper No. 104, (1915).
[8]United States Bureau of Mines Technical Paper No. 142, (1916).
[9]Industrial and Engineering Chemistry, Vol. 15, No. 11, pp. 1,143-46, November, 1923.
[10]Industrial and Engineering Chemistry, Vol. 15, No. 6, p. 592, June 1923.
[11]Motor Fuels, Dr. E. H. Leslie (Chemical Catalog Co. Pub.), (chapter on Laboratory Methods).
[12]American Petroleum Institute Research Project No. 9.
[13]"Isotopes," by Dr. F. W. Aston (Edward Arnold & Co., London, Eng.), 1924, pp. 24-64.

CITIES SERVICE EXTENSIONS ADD COMPRESSOR FACILITIES

The extension of the Cities Service Line from Wichita to Ottawa makes necessary another 1,000 h.p. unit in the compressor plant at Ottawa, which will add approximately $150,000 to the value of the property. Construction on the new unit is already under way. The Compressor station south of Wichita will also be enlarged. C. & G. Cooper equipment is being installed.

NATURAL GAS EQUIPMENT IN MID-CONTINENT OFFICE

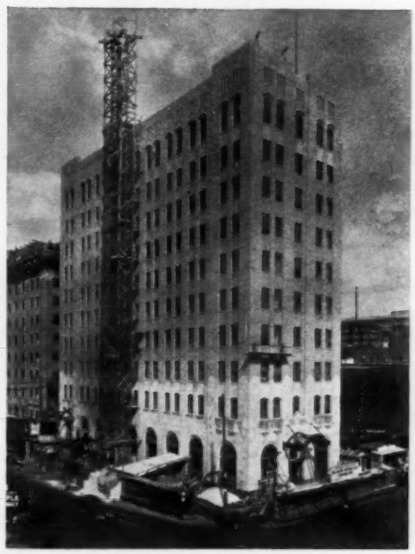
The Natural Gas Equipment Company of Los Angeles, California, has opened a Mid-Continent office in the Atco Building, Tulsa, Oklahoma, with William Chase as resident manager of the office and Virgil E. Ready, chief engineer. Complete stocks of Wilgus Pressure Regulators and National Gas Burners, which the company distributes, will be carried in the Mid-Continent office.

STANDARD GASOLINE COMPANY'S 1927 FIGURES GIVEN

In the Standard Oil Company of California's stockholders' statement for the year 1927 it was reported that the Standard Gasoline Company, subsidiary of the Standard Oil, was operating 54 compressor plants at the close of last year. These plants were processing 315,000,000 cubic feet of gas daily from 270 leases with 73 companies, and were producing daily 395,000 gallons of gasoline.

LINE TO LAPORTE, TEXAS

The Houston Pipe Line Company, of Houston, Texas is extending a 12-inch gas line from Baytown, Texas to LaPorte, Texas to supply gas to several large industrial plants there as well as to domestic consumers.



Construction progress on new headquarters of Oklahoma Natural Gas Corp., Tulsa, Okla.

Oklahoma Natural Soon *in* New Headquarters

OKLAHOMA Natural Gas Corporation's new 10-story general office building at Tulsa is expected to be ready for occupancy late in the present summer. The structure, which is 50 feet in frontage on South Boston Avenue and 150 feet on Seventh Street, has an exterior finish of light tan brick with limestone trim. The architectural lines are of the modernistic school of office building design.

The Tulsa city office will be on the ground floor with the entrance on the Boston Avenue side, while the elevator entrance will be on Seventh street. The tenth floor will house the executive offices of the company, while the lower floors will be devoted to various departments of the organization. Practically the entire structure will be occupied by the gas company.

The Oklahoma Natural, following its recent acquisition of the gas properties of the Oklahoma Gas & Electric Company, now serves 53 cities and towns, among which are Tulsa, Oklahoma City, Muskogee, Okmulgee, Sapulpa, Enid, El Reno, Shawnee, Norman and Ardmore. It obtains its gas supplies from more than 30 different natural gas fields.

GAS DEPARTMENT OF COUNCIL BLUFFS COMPANY SOLD

On June 1st the gas plant and distribution system of the Citizens' Gas and Electric Company, Council Bluffs, Ia., was formerly transferred to the Council Bluffs Gas Company, represented by H. L. Mann, new operator of the utility. The Citizens' Gas and Electric Company, of which Frank F. Everest is president, will continue to operate the Electric branch of the company.

UNION GAS CORP. BUYS GAS PLANT AT DEARING

The gas plant at Dearing, Kansas, formerly owned by John M. Lemon of that city, has been purchased by the Union Gas Corporation. The plant was purchased from the Empire Company six years ago. A contract to furnish gas to the Montgomery County Packing Company, located north of Dearing, was included in the contract. A four-inch line will be laid to the plant from the 10-inch line recently laid between Coffeeville and Graham station.

GAS MEN FLY, AS GUESTS OF W. F. ROCKWELL

W. F. Rockwell, president of the Pittsburgh Equitable Meter Company arrived in Los Angeles with a party from the east Friday, June 8, on a special train to attend the American Water Works Convention at San Francisco.

On Saturday morning, June 9, at 10 o'clock Mr. Rockwell took a few members of his party and some Los Angeles gas men to San Diego in a Tri-motored Pullman plane of the Mattox Air Line. The party landed at Rockwell Field, had luncheon at the Coronado Hotel, left Coronado at 2:30, arriving back in Los Angeles at 4:00 P. M. Those in the party included: H. L. Masser, vice-president, Los Angeles Gas and Electric Corporation; A. F. Bridge, vice-president, Southern Counties Gas Company; Chas. D. Bell, superintendent of distribution, Southern California Gas Company; W. M. Henderson, superintendent of distribution, Los Angeles Gas and Electric Company.

After the Convention in San Francisco Mr. Rockwell and party toured the Yosemite Valley.

Following recent voting of a franchise to the Kansas City Gas Company by residents of North Kansas City the company will begin construction of a line to serve domestic and industrial consumers in the new territory about July 1st.

Four women's team participated in the first aid contest staged by the Pacific Power and Light Company at Pasco, Wash., on May 19.

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and
INDUSTRIAL
GAS APPLIANCES
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ROBINSON ORIFICE FITTING

Natural Gas *for* Denver

(Continued from Page 17)

certain the number and kind of appliances in use. From this, customers' inspection materials were ordered for the replacement of orifices, and in some cases burners, for the different appliances. Several carloads of this material are stored in the warehouse ready for use when natural gas is turned on.

For the adjustment work, the men will be divided into 20 squads of 12 men, each under an experienced foreman. Each squad will work from a headquarters centrally located in the sub-district assigned to it, where will be stored all records and materials required. The men will be given cards for each customer, which have been previously filled out in the Customers' Inspection, showing all data required. To the card is attached an envelope containing the orifices required. Special, or follow up, crews will handle all special appliances or situations that might tend to slow up the regular adjustment work if carried out by the regular squads. In addition, special complaint men will work out of central headquarters to handle any emergency complaints coming up in the districts being converted. While no difficulties of any consequence are anticipated, every precaution is being taken to give the customers the best possible service while the conversion from manufactured to natural gas is in progress.

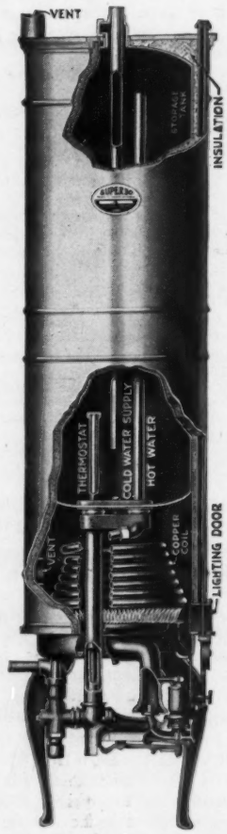
As a step in the program of preparation for conversion to natural gas, a widespread campaign of publicity is being carried on in newspapers, and otherwise, in which the customers are informed when natural gas will be turned into a particular district and what to expect. They are given instructions in how to use their appliances until the adjusters get to them. In addition, a force of telephone operators, under an experienced foreman, have been trained to answer the telephone calls that are bound to come in from customers, despite any publicity that might be given. These operators will, if possible, avoid any unnecessary trouble calls by the emergency crews.

The work of every gas company that has changed from manufactured to natural gas in recent years has been studied and extensive thought and planning has been done, with a view to overlooking nothing that might contribute to the carrying out of the conversion program in Denver in the most successful manner possible. It is the ambition of Public Service Company of Colorado to make a record of achievement in their part of the work of introducing natural gas in Denver, no less outstanding than that made by Ford, Bacon & Davis in the construction of the pipe line.

SUPERBO AUTOMATIC STORAGE WATER HEATERS

Manufactured in Los Angeles Since 1914

Superbo "Safety"



A Quality Product

FEATURING: — Dual Safety Control — Detachable Heating Unit—Safety Gas Shut-off.

No. 1—22 gallons . . . $ 97.50
No. 2—30 gallons . . . 125.00
No. 3—40 gallons . . . 150.00
No. 4—66 gallons . . . 250.00

Prices F. O. B. Factory

Manufactured by

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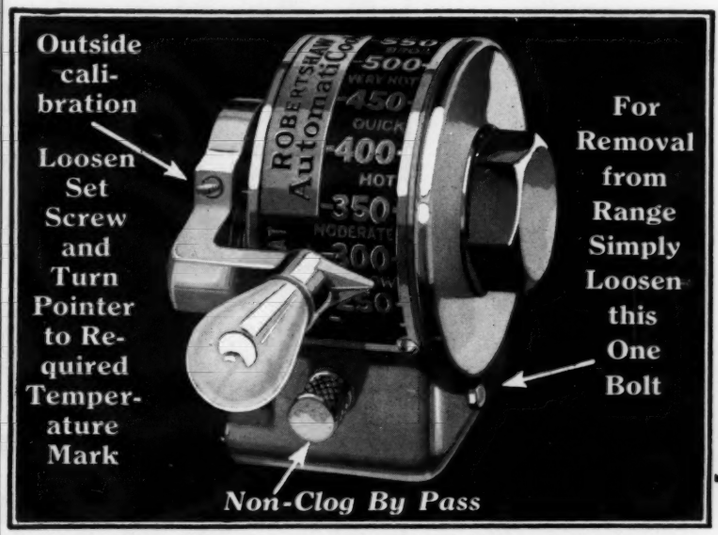
GAS COMPANIES and STOVE DEALERS



Appreciate the Exclusive Advantages of the "B" Type

ROBERTSHAW AutomatiCook

TRADE MARK

Outside Calibration. Takes just a few seconds to change the temperature setting if required, by means of a convenient set-screw on the temperature pointer. Merely loosen the set-screw, move the pointer to the proper temperature mark on the dial, and then tighten the set-screw.

Quick Removal. Should the "B" Type AutomatiCook become damaged for any reason, necessitating replacement, it can be removed without disconnecting the range or disturbing the linings or the piping. Requires no mechanical servicing or repairs on the job. Simply loosen one bolt, replace the Thermostat with a spare and tighten the bolt. The job can be done in less than a minute's time.

Non Clog By-Pass Pilot. Will not clog nor bind. Always moves freely and maintains its adjustment. Eliminates servicing, adjusted by turning either to the right or left.

Non-Corrosive Valve Seat. The AutomatiCook is now being equipped with a Raised Non-Corrosive Valve Seat which will resist the corrosive action of gas, eliminating any possible trouble from this source.

Write for 8-Page Folder, illustrating and describing the above advantageous features.

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Youngwood, Penna.

The Robertshaw AutomatiCook is now used on more than 80 leading makes of Gas Ranges

Stockton Fire Brick Company

FIRE BRICK, INSULATING BRICK
HIGH TEMPERATURE CEMENT

High Grade Refractories
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GENERATOR LININGS
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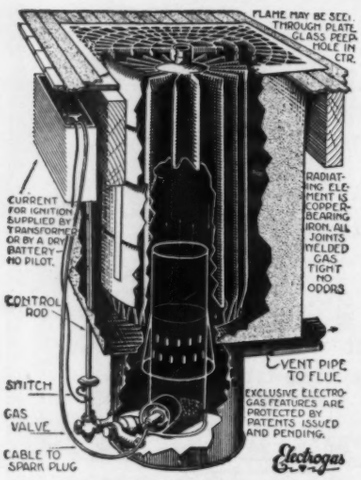
it's matchless!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RADIATING ELEMENT IS COPPER-BEARING IRON. ALL JOINTS WELDED GAS TIGHT NO ODORS
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EXCLUSIVE ELECTROGAS FEATURES ARE PROTECTED BY PATENTS ISSUED AND PENDING.
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—approved by A. G. A.
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GAS EXHIBITS AT VICTORIA HOME PRODUCTS EXPOSITION

The gas department of the B. C. Electric Railway Company at Victoria, B. C. was recently well represented at the Home Products Exhibition held in that city. The company's stand was framed in an eastern type of building erected for the purpose and was devoted equally to gas and electrical appliances. The gas section contained a gas range, gas refrigerator, and gas water heaters, while an inscription above the door pointed out that the company had made 141,436,700 cubic feet of gas in Victoria in 1927.

The exhibit was visited by over 12,000 persons, which included Their Excellencies the Governor General of Canada and Lady Willingdom, and His Honor Robert R. Bruce, Lieut. Governor, of British Columbia, and his niece, Miss Helen MacKenzie.

LOUISIANA CONSERVATION PUBLICATION

The Eighth Biennial Report of the Department of Conservation, State of Louisiana, covering the period from April 1st, 1926 to March 31, 1928, is just off the press. It contains important chapters from the pen of William F. Chisholm, director of the Division of Minerals, among them a 27-page chapter on natural gas and natural gas-gasoline.

PHILLIPS PANHANDLE PLANT OPERATES ON WELL PRESSURE

The Phillips Petroleum Company is erecting a new type gasoline plant in Section 22, Block Y. M. & C. Survey, Hutchinson County, Texas with a capacity to handle 60,000,000 feet of lean gas per day. The plant is being built especially to meet certain conditions found in the Panhandle fields of Texas. It operates on a well pressure system, making unnecessary the engines for compression and pulling vacuum. The capacity in volume of gas in this plant is said to be larger than the volume of any other plant in the Mid-Continent.

E. S. BROWNING DISTRICT MGR. FOR HILL, HUBBELL & CO.

Edgar S. Browning has been made district manager of the Mid-Continent territory for Hill, Hubbell & Company of San Francisco His headquarters will be in Tulsa, where the company maintains a factory branch. Mr. Browning has formerly been associated with the San Francisco office of the company and succeeds the late Glen G. Langan at the Tulsa office.

VANCOUVER COOKING SCHOOL

One of the most successful and best attended cooking schools ever arranged by the gas department of the British Columbia Electric Railway Company was recently held in the Canadian Legion Memorial Hall Forty-Second avenue west, Vancouver, B. C. The school was in charge of Fred Arnott and Walter Soresby, district representatives of the gas department.

NEW HIGH LEVEL SET FOR CUSTOMER OWNERSHIP

Customer ownership sales of preferred shares of the subsidiary and affiliated public utilities of Standard Gas and Electric Company again established a new high record in 1927, when par value sales totaled $31,975,600, an increase of 27.58 per cent over the previous high record of $25,061,600 in 1926. There were 42,267 separate transactions, the average par value per sale being $756.

NEW BILLING PRACTICE BRINGS RATE DECREASE

W. G. Murrin, vice-president of the B. C. Electric Railway Company, Vancouver, B. C., states that a general reduction in gas rates has been put into effect by a new system of billing.

For the company's own convenience in handling accounts, bills are now sent out for the net amount due, in place of the gross amount on which discount was allowed he declared. Formerly, if bills were paid within a certain date a discount of 10 per cent was allowed. Under the new system the discount is allowed but does not show on the bill, it is stated.

In effect this has resulted in a general decrease of ten cents per thousand cubic feet in the cost of gas, according to Mr. Murrin. Formerly the cost was $1.50 for the first 1000 cubic feet, now it is $1.40. Gas in excess of 4000 cubic feet was formerly charged at $1.35 per thousand, and now it is $1.25. Excess of 15,000 cubic feet formerly was $1.30, and now it is $1.20, and anything over 20,000 feet was formerly charged at $1.25 per thousand, and now it is $1.15.

SURVEY FOR ARKANSAS LINE

Arkansas Natural Gas Corp. began early in June to survey for a gas line from Little Rock to Conway as an extension to the line from the Clarksville gas fields to Conway. The extension will be approximately 40 miles in length. From the fields the line will be 125 miles long and will be constructed at a cost of around $5,000,000. It will extend through Russellville and Morrilton to Conway.

GAS MAN WORSTS ELECTRIC ASSOCIATES ON PLATFORM

Speaking on the subject "Electricity Is Cheap, Use More of It," Ray Edwards of the San Diego Consolidated Gas & Electric Company's gas distribution department won a three-minute speaking contest held among employees of the company, late in May. As a result of his victory the gas man won a trip to the Pacific Coast Electrical Association convention at Pasadena on June 12.

FOSTER NOW WITH HOT-N-KOLD

Morris L. Foster, formerly commercial agent for the Coast Counties Gas & Electric Company at Santa Cruz, has resigned to become associated with the Hot-N-Kold Company as manager of the Contra Costa and Alameda Counties. His position with the gas company is being taken by Frank E. Cronan, who was formerly with the Western States Gas & Electric Company at Richmond.

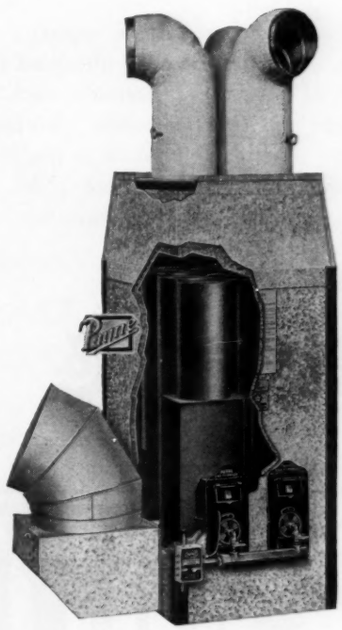
INCORPORATION AT CLAYTON

On June 4th the Clayton Gas Company of Clayton, N. M., was incorporated for $25,000, the incorporators being V. A. Hays, H. A. Mayer and E. A. Sickels of Independence, Kans.

A house heating survey of homes in Pueblo, Colo., is being conducted by the Pueblo Gas and Fuel Company, incident to the introduction of natural gas in that community. Estimates on installation and operation costs are submitted to prospective consumers and each consumer is left a copy of the company's heating booklet, "Pueblo's New Natural Gas."

The Citizens Gas Company of Fort Smith, Arkansas, has been granted a permit to lay a six-inch gas line from the company's gas field near Roland, Okla., to the Harding Glass Company's plant in Fort Worth. The line will be 14 miles in length and will extend across the Arkansas River.

Proof of Adaptability of Payne Gas Furnaces



At the present time Payne Furnaces are operating satisfactorily in Residences, Apartments, Schools, Churches, Theatres, and Factories. They are adaptable to any type of warm air heating.

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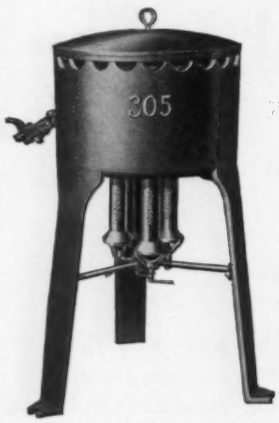

Use This Johnson Furnace!

This efficient furnace has a capacity of 300 pounds. Quick results are obtained through the use of four large burners, each having pilot light and shut-off valve. No blower is needed. A special feature is the draw-off valve which will not freeze. It permits drawing off the metal as soon as melted. Write for full details.

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Cedar Rapids IOWA

Pacific Coast Representative—C. B. Babcock Co.
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Get an Option on Future Customers!
supply them with
ROCKGAS

A form of pure natural gas liquified under pressure in convenient sized tanks. Smallest, 12x37 inches, holds equivalent of 2666 cu. ft. 500 b.t.u. gas. Largest, holds equivalent of 36,550 cu. ft. of 500 b.t.u. gas. Many other sizes.

Pave the Way for Gas Extension

Install ROCKGAS in places where natural or artificial gas is not available. Give temporary service now, pending further extension of your gas mains. ROCKGAS now used and endorsed by homes, camps, stores, etc. throughout the United States.

A few rich California territories open for distributors. Write today for full details.

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SOUTH CHESTER STEEL PIPE

Excels for Gas Service

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

SOUTH CHESTER TUBE CO.
Chester, Pa.

HIGH PRESSURE LINE REPORTED PROJECT, FOLLOWING MERGER

The Consolidated Gas Utilities Company, incorporated recently in Delaware for the purpose of acquiring the gas properties of the Larutan Gas Corporation, the former Midwest Gas Company, the Oklahoma Northern Utilities Company and the Oklahoma Northern Gas Company, also plans to construct a 14-inch high pressure pipe line from the Wheeler County extension of the Amarillo gas fields, according to a press report. It is stated that $16,000,000 in bonds will be sold to finance the new corporation, and when the merger is completed, the system will constitute one of the largest in the Mid-Continent.

LINE TO FORT D. A. RUSSELL MAY BE LAID

Proposed construction of a high pressure gas line from the Lincoln Highway west of Cheyenne, Wyo., to Fort D. A. Russell has been reported. The project is in the hands of army officials and representatives of the Colorado-Wyoming Gas Company, and, together with the laying of a distribution system at the army point, would cost approximately $85,000.00.

LOWER WATER HEATER RATES

Water heating rates in Pocatello, Ida., have been reduced by the Pocatello Gas Company, according to L. H. Stratford, manager of the company. Minimum charge of $2.00 has been reduced to $1.00, and the general water heating schedule has been lowered below $1.00 per 1,000 cu. ft. up to 10,000 cu. ft. and to 65 cents per thousand above 10,000.

M. F. WALES COMPLETES TRIP OF INSPECTION

Morris F. Wales, general agent of the Coast Counties Gas and Electric Company, has returned to San Francisco from an extended trip through the east and middlewest. Mr. Wales visited the public utilities in Denver, Omaha, Chicago, Pittsburgh, and New York, primarily to investigate sales and merchandising plans of the large eastern utilities.

NEW BUSINESS STAFF ADDED TO BY B. C. ELECTRIC

O. L. Mullett has joined the staff of the gas new business department of the British Columbia Electric Railway Company at Vancouver, B. C.

Percy Garnham has also joined the gas new business department at Vancouver, and will specialize on water-heating jobs in the commercial area.

REPLACE SIX-INCH LINE

The Union Gas Corporation of Coffeyville, Kansas, is replacing a six-inch gas line from the National Refinery at Coffeyville to a point near Bolton, with a 10-inch line.

U. S. SURVEY ON MINERAL PRODUCTION

According to a tabulation recently made by the United States Bureau of Mines, the state of Pennsylvania, due to its coal output, continues to lead in production of minerals, other principal mineral products being those of clay and natural gas. In 1926 Pennsylvania's mineral production amounted to $1,055,766,000. Oklahoma, California and Texas ranked second, third and fourth, respectively in mineral production, natural gas and zinc, in addition to petroleum, being a heavy factor in Oklahoma's showing of $569,519,000. Natural gas and cement, with petroleum, swelled the California output to $523,352,000. Texas petroleum output, plus sulphur and natural gas production, brought that state's total to $420,587,000.

ATTRACTIVE INDUSTRIAL SALES BOOKLET ISSUED

Kansas City Gas Company and the Wyandotte County Gas Company have issued a new industrial booklet entitled, "Gas a Contribution to the Industries of the Kansas Cities". The purpose of the booklet, according to T. J. Strickler, vice-president and general manager of the Kansas City Gas Company, is to show the effort the two above mentioned gas companies are making toward furnishing gas for industrial purposes in Greater Kansas City, and to sell prospective industrial users on gas as the ideal fuel for their demands.

The booklet, which was prepared by Ray Ratliff, advertising manager of the Kansas City Gas Company, consists of 40 pages and cover, presenting in pictorial form and through brief descriptions some of the outstanding facts regarding industrial gas consumers on the lines of the two companies concerned. The booklet is gotten up in extremely attractive form and could well serve as a model to companies desiring an industrial sales booklet.

HOUSE HEATING IN MISSOURI

According to R. E. Duffy, service engineer for the Missouri Public Service Commission, Jefferson City, Mo., there are over 2900 house heating installations in Missouri, with 1700 additional installations expected during the balance of this year.

POST AND SOUTHLAND DUE FOR GAS SOON

The West Texas Gas Company is extending its gas distribution lines from Slaton, Texas to Post to give gas service to that city and to Southland. The John W. Moore Construction Company, has the contract for laying the line.

WATONGA FRANCHISE

The Central West Gas Company of Tulsa and Sayre, Okla., has been granted a 25-year gas franchise in Watonga, Okla. Gas will be piped from wells at Sayre and will be ready for the consumers by November 1st.

MANAGER AT TEAGUE, TEXAS

C. A. Montgomery has been named manager of the Community Natural Gas Company at Teague, Texas. Mr. Montgomery was formerly a manager for the company at Mesquite, Texas.

INSTALL WATER GAS PLANT

The Macon, Mo., gas company is remodeling and improving its plant at a cost of approximately $7,500. Among the improvements being installed is a water gas plant and a booster.

SKELLY OIL COMPANY TO SELL LIQUIFIED GAS

Skelly Oil Company, through a new unit known as the Skelgas Utility Division, is to begin the sale of a liquified gas product consisting largely of propane, to consumers located in territory not served by gas utilities. The product will be bottled at Oklahoma and Texas natural gasoline plants operated by the company at present and shipped direct to dealers, but later it is planned to erect distributing headquarters to which the gas will be shipped in tank cars.

DOHERTY EMPLOYEES PICNIC

On the afternoon of June 26th was held the annual Doherty Men's Fraternity picnic for members and families of Doherty employees in Kansas City and vicinity.

Get This "Margin of Safety" in Pipeline Protection!

True economy in pipeline protection lies in adopting a coating for the whole line that will take care of the worst conditions encountered or anticipated and still provides an added margin of safety.

It is good judgment to specify PIONEER RUBBERTEX because it gives complete protection against the ravages of soil acids and alkalis . . . against erosion and corrosion . . . against electrolysis, moisture, temperature fluctuations . . . and time.

Performance has proved its value!

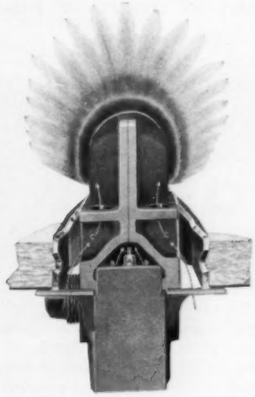
PIONEER PRODUCTS

PIONEER PAPER COMPANY, INC.
Established 1888
55th & Alameda
LOS ANGELES, CAL.
DE 2111

Pioneer
RUBBERTEX *and* PIPE COVERING

San Francisco · Portland
Seattle · Spokane
Denver · Salt Lake

R.M.C.



The gas burner with a snappy, high temperature flame

Rotary Manufacturing Co.
5720 Long Beach Avenue
LOS ANGELES

SPECIFY *ARCO* FOR YOUR MAINTENANCE AND FINISHING JOBS WITH THE CONFIDENCE THAT YOU ARE ORDERING THE BEST PAINTS AND PROTECTIVE PRODUCTS . . . AT A REASONABLE PRICE. THEY WILL HELP YOU CONQUER RUST AND LOWER YOUR MAINTENANCE COSTS . . . . . PERMANENTLY.

THE ARCO COMPANY

CLEVELAND, OHIO

Pacific Coast Branch
116 New Montgomery St.
San Francisco, Calif.

Branches and Warehouses in Principal Cities

192

ARCO

Paints . Varnishes . Enamels . Lacquers

A Modern Kitchen *on* Tour

(Continued from Page 19)

the one-day program, in each place were held lecture-demonstrations on cakes, pastries, oven dinners, meat, cookery, balanced meals, and plans for the "daily three," interspersed with suggestions on easier ways to do things and how to put joy in the doing. Time was given at each program for a discussion of the most modern of gas and electric equipment, home lightning and kindred subjects. Souvenirs consisting of a collection of recipes on cards of recipe file size were given out by "Home Service" at each meeting.

Transportation problems were comparatively simple. The set is so constructed that it may be packed in crates and shipped by train or truck from place to place, the walls, ceiling, alcoves, proscenium arch, etc., being built in sections which are hinged and bolted together when set up. The dimensions are approximately 24 feet (spread) by 14 feet deep and about 10 feet in height. The kitchen is indeed a thing of beauty—and —from the standpoint of one who has worked in it—a joy forever!

The Pacific Service Kitchen is at the present time serving as the setting for a series of cooking schools which are being conducted by the Pacific Gas and Electric Company in conjunction with a group of Sacramento Valley newspapers. Its original purpose—that of an educational feature—remains unaltered.

Effect *of* Pressure *upon* Leakage

(Continued from Page 18)

Table No. 4 and the corresponding graph cover the results of a test made at pressures up to 13 lbs. per sq. in. to determine whether or not the same relation holds good at the higher pressures. Accurate regulation of pressure with the small flow being measured was found rather difficult and some discrepancies probably entered the measurements for this reason, but in spite of this there was little deviation from the direct proportion of pressure to leakage.

TABLE NO. 4
TEST ON 3300 FT. OF 4-IN. STEEL MAIN—DRESSER JOINTS

Pressure (Lbs. per sq. in.)	Leakage (Cu. ft. per hr. at 5.0 in.)
13.0	106.5
9.0	65.2
5.5	42.6
2.7	41.2
0.3	3.4

It is apparent from these data that a modification of the orifice flow formula is necessary before it can be applied to underground leakage. Since the only new factor introduced when pipe lines are buried is the ground resistance this is obviously the element which is responsible for the discrepancy. The marked influence of the soil resistance in determining the rate of leakage has already been noted in connection with the results of tests made during wet weather, and this leads to the conclusion that the rate of leakage from a hole of given size in a

GAS or WATER Connections

whether screw thread or gasket, should be made up with KEY SPECIAL PIPE JOINT COMPOUND.

KEY SPECIAL PIPE JOINT COMPOUND is not a quick hardening cement, but a plastic lubricant and a filler that will seal the most obstinate joint with ease. It covers more surface than an equal volume of red or white lead, thereby reducing the cost. It is waterproof—and there is no waste.

Manufactured by

E. A. Key Co., Inc.

1431 Santa Fe Ave.
Los Angeles, Calif.

Distributors in all prineipal cities.

WRITE FOR FREE SAMPLE

buried pipe is a function of the rate of diffusion through the surrounding soil.

Gas passing from a hole in the pipe out through the soil may be considered as flowing through a series of orifices between the particles of soil. The total area of these orifices is constantly increasing as the distance from the pipe increases. If we assume for the purpose of discussion a homogeneous soil compressed to the same degree at all points around the pipe and describe a sphere around the hole in the pipe as a center the quantity Q of gas passing the limits of the sphere at any time will be equal to Av, where A is the effective orifice area and v the velocity of the gas. Since $v=K\sqrt{2gh}$ according to the orifice flow formula, then $Q=K_1A\sqrt{h}$. The value A, however, is not an independent variable as in the case of ordinary orifice flow, but is a function of the average velocity between the initial point and the limits of the sphere. From the formula for the surface of a sphere it is found that A is proportional to the square of the average velocity. The velocity at any point is also proportional to the square of the average velocity, therefore $A=K_2v$ or $A=K_2\sqrt{2gh}$. Substituting this value of A in the orifice flow formula, $Q=Kh$, which expressed in words is that the quantity varies directly as the pressure.

These theoretical considerations agree with the test data, and indicate that the explanation for the divergence of the pressure effect on underground leakage from the usual orifice situation lies in the constantly increasing effective orifice area due to the gas penetrating the soil in all directions from the point where it leaves the pipe. In view of the quite consistent results of the tests it therefore appears that the rule can be established that the rate of leakage from a buried pipe line varies in direct proportion to the pressure.

Building New Business *on* Existing Mains

(Continued from Page 28)

can remember when automobile advertisements were concluded with a long list of "specifications." They certainly are not today; the valuable space formerly thus taken up is now devoted to pictures and copy describing the pleasures of ownership. Surely we can do no better than to follow the example of this most successful industry, and sell the results possible with our appliances, rather than the equipment as such. Of course, the appearance of a gas range or space heater may be a deciding factor, and should be emphasized as well.

To summarize: We should utilize all possible means of building up our per consumer load, in order to counteract the various factors now tending to lower it. Unless we do this we will probably find that it will progressively decrease and be all the more difficult to build up later on Now is the time for us to put forth every effort, not only to hold the load which we have, but to materially increase it.

ROSENBURG, TEX., CONSUMERS TO HAVE GAS SUPPLY

A gas franchise has been granted to the Houston Gulf Gas Company to supply gas to domestic and industrial consumers in Rosenburg, Fort Bend County, Texas. A line seven miles in length is already under way to connect with the trunk line of the company extending from Southwest Texas fields into Houston. Gas will be supplied to cotton gins and a large brick plant near the city.

We are now prepared to furnish

Reliance Balanced Valve Regulators

In sizes up to four inch for both high and low pressure delivery.

It will be interesting and profitable to you to investigate the merits of this new device.

Reliance Manufacturing Company

ALHAMBRA, CALIF.

Mettler Entrained Combustion Gas Burners

FOR ALL Purposes Kinds of gas Pressures

406 S. Main St. LEE B. METTLER CO. Los Angeles, Cal.

FIRE BRICK

LININGS, CHECKERS and BOILER SETTINGS are carried in stock for quick shipment. If special or hand-made shapes are required, our plant is especially equipped to make them.

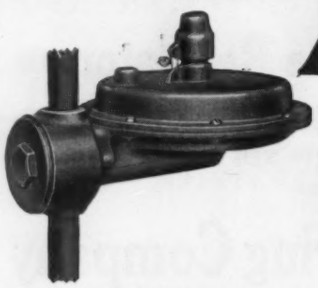
CLADDING, Mc BEAN & CO.

SAN FRANCISCO LOS ANGELES

PORTLAND SEATTLE

421

MODEL 10 SERIES
With or Without Mercury Seal



Spring Type
Also furnished in Dead Weight Type

Reynolds
Gas Control Since 1892

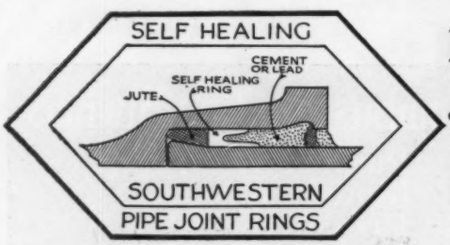
Products for all kinds of Pressure Reduction—for either artificial or natural gas.

GOVERNORS — Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.

VALVE—Automatic Quick Closing Anti Vacuum.

REYNOLDS GAS REGULATOR COMPANY
Anderson, Indiana



Make Your Gas Joints Self-Healing

Sample Ring for Test Furnished on Request. No Charge

Southwestern Pipe Joint and Engineering Co.

1108-10 Fifth Avenue

Birmingham Alabama

ADD TO TRUCK FLEET

In order to meet the increasing demand for Gasco Motor Fuel, the Portland Gas & Coke Company is adding an additional tank truck to its present fleet. The additional equipment will consist of a five-ton White truck, semi-trailer, and 2700-gallon two-compartment oval tank. This truck is designed to utilize the maximum loading permitted by the Oregon State laws, which allows a loading of 5600 pounds on the front tractor axle, 14,400 pounds on the rear tractor axle and 14,400 on the semi-trailer axle. The truck will be equipped with enclosed cab, booster brakes on both truck and semi-trailer, and facilities for unloading from either the side or rear of tank.

SIGN CONTRACT ON FINANCING OF REFRIGERATOR SALES

Contract for the financing of wholesale and retail sales of Servel and Electrolux refrigerators has been signed by Servel Sales, Inc., and the Commercial Investment Trust Corporation, it is announced by the Servel Corporation. Installment sales will be financed up to 90 per cent of the selling price over a period of 18 months under the new financing plan, according to H. W. Foulds, general sales manager. The wholesale plan will finance dealers on warehouse stock over a period of 90 days.

The 31-acre Servel plant at Evansville, Ind., has just been supplemented by another building for the production of Electrolux units. Ground for the new building, which is a permanent one-story structure of hollow-tile, concrete and corrugated iron construction, was broken one Monday morning and the factory was in production the following Monday.

DAVIS SUCCEEDS DANNER

Harry E. Danner, commercial manager of the Houston Gas & Fuel Company, has resigned, his place being taken by Robert E. Davis who has been associated with the Houston Company for 10 years.

TEXHOMA MAINS GOING IN

The Texas County Gas Company has started work on its gas distribution system, to be installed at Texhoma, Okla.

ARKANSAS CITY ADDITION

The Arkansas Valley Gas Company, of Arkansas City, Kansas, plans to extend its line from the South Summit Street bridge to the state line, to serve potential customers along the route.

VICTORIA LINE ADDITIONS

The Victoria Gas Department of the B. C. Electric Railway Company is at present laying new gas mains to Cordova Bay, Vancouver Island. Other extensions are also being made in the Saanich Peninsula along the east and west roads. Yet another extension is being completed along the Island Highway.

EDUCATING EMPLOYEES ON APPLIANCE SALES

The new business department of the Wyandotte County Gas Company of Kansas City, Kansas, is conducting each Monday night an educational campaign on gas appliances and gas service for the benefit of its employees.

MAIN EXTENSIONS ON B. C. ELECTRIC SYSTEM

The B. C. Electric Railway Company's gas department will shortly commence laying 4150 feet of four-inch gas pipe and 2600 feet of six-inch pipe in the new subdivision of Westmount in West Point Grey.

VICTORIA APARTMENTS USE GAS APPLIANCES

The British Columbia Electric Railway Company's gas department recently installed six ranges and six fires in one new apartment house in Victoria, B. C., and gas ranges have also been installed in another apartment block in the same city.

NEW VETERAN'S HOSPITAL ON PORTLAND GAS MAINS

The construction of the new Veteran's Hospital at Portland is now well under way and the Portland Gas & Coke Company has just completed installation of a new main to supply the hospital group. The hospital buildings are located on Marquam Hill, 500 feet above the city, and will form a part of the Marquam Hill medical center, which already includes the Multnomah County Hospital, the Doernbecher Memorial Hospital and the Medical School of the University of Oregon. Approximately one mile of six-inch main was laid to serve the new hospital and to reinforce the supply to the other institutions.

TROUP, TEXAS, ON DIXIE LINE EXTENSION

The Dixie Gas & Fuel Company of Houston is piping the town of Troup, Texas, for gas, to be supplied from the line extending from North Louisiana to Houston, which runs within a mile of Troup.

TO SERVE GLASS PLANT

The Railroad Commission of Arkansas has granted a permit to the Citizens' Gas Company of Fort Smith to construct a gas line to the Harding Glass Company's plant in Fort Smith from its gas fields north of Greenwood Junction.

KANSAS CITY CONSUMPTION ON UP ROAD

Current daily gas sales in Kansas City show an increase of 25,000,000 cu. ft. over last year, according to announcement from the Kansas City Gas Company. The total amount consumed daily at the present time is 40,000,000 cu. ft. as compared to 15,000,000 cu. ft. this time last year. An increasing number of Kansas City industries are solving their fuel problems with gas, to which fact the increase is attributed. The present load will be materially increased within the next few weeks when gas it turned on at the Standard Oil Company's refinery in Sugar Creek, Mo., which will add a consumption of 10,000,000 cu. ft. daily.

BUYS EUREKA GAS COMPANY

The Eureka Gas Company, supplying gas to 1000 consumers of Eureka, Kansas, has been purchased by the S. R. Morgan Utilities Company of Muskogee for a consideration of $300,000.

ASK WILLISTON CHARTER

Homer E. Hursh and O. M. Opdahl have applied to the city commission of Williston, N. D., for a franchise to serve gas, which would be obtained from wells to be drilled four miles south of Ray and about 25 miles east of Williston.

RECONSTRUCT GAS HOLDER

Orders for the reconstruction of the Western States Gas and Electric Company's 750,000 cubic foot gas holder at Stockton have been approved, according to H. B. Heryford, division manager of the company. Approximately $45,000 will be expended for the rebuilding of the gas tank, which will provide more adequate facilities for the storage of gas.

SPRAGUE METERS

Represent Twenty-five Years of Progress

We are proud of our Service in the West

Sprague Meter Company

BRIDGEPORT, CONNECTICUT

Los Angeles, California — San Francisco, California

Davenport, Iowa — Houston, Texas

HOT-N-KOLD

The Hot-N-Kold Shops are now serving the public in eight cities in the northern part of California with Kelvinator Refrigeration, Holbrook Ranges, Welsbauch Water Heaters, and other major appliances.

A valuable business franchise awaits the right dealer in every town.

HOT-N-KOLD CORPORATION

949 Mission Street — **San Francisco, California**

GILFILLAN
Dual Control Valve Regulators

Write for literature

SAVE ONE INSTALLATION

Maintain a constant steam pressure on the boiler
and
Reduce and maintain an unvarying gas pressure to the burner regardless of the variation in line pressure.

Built to control Boiler pressure from one pound to 200 pounds steam, and deliver as low as two ounces gas pressure at the burner.

GILFILLAN MACHINE WORKS, Inc.
Ebenezer, Erie Co., N. Y.

Representatives
Jensen Instrument Co., 624 E. Fourth St., Los Angeles, Calif.
Gas Appliance Service Corp, 2014 Bryan St., Dallas, Texas.
The Diamond Supply Co., Charleston, W. Va.

The Magic Way Company

Gas Heating Devices

including

"Magic Way" Gas Furnaces
"Magic Way" Control Valves and Switches
"Potter" Radiators
"Steel Made" Radiators
"Cole" Floor and Wall Heaters
"Hall" Floor Furnaces

Manufactured by

Magic Way Company
National City San Diego California

PENINSULAR IMPROVEMENT CAMPAIGN FOR P. G. AND E.

To meet increased demands for gas in the peninsula territory the Pacific Gas and Electric Company is starting a $464,827 project which will include the installation of 15 miles of 16-inch high pressure gas main.

The line will start at the Potrero gas works in San Francisco, and will extend through Daily City, South San Francisco, and San Bruno to Lomita Park, where it will join the present 8-inch high pressure line now serving the peninsula and extending south to San Jose.

The 16-inch line will be extended farther south as needed to supply additional demands. The pipe has arrived for the new project and work will start within the next 10 days, according to J. D. Kuster, division manager of the company. The project is ta be completed in time to carry the fall and winter demands for gas throughout the territory. The entire 15 miles is to be made up of 16-inch steel welded pipe.

APPLIES TO ERECT CARBON BLACK PLANTS IN TEXAS

The Coltexo Corporation has filed a request with the Texas State Railway Commission to build three carbon black plants in the Panhandle fields of Texas during the next year. The Commission was to take action on the request May 31st. The first plant will be erected at LeFors, Texas, and construction will be begun immediately following the action of the Commission, providing it is favorable. At six-months intervals the other two will be erected.

MONTANA-DAKOTA POWER CO. BUYS CONSOLIDATED GAS

Common stock of the Consolidated Gas Company, distributors of gas at Mandan, Bismarck, and Valley City, North Dakota, has been purchased by the Montana-Dakota Power Company, distributors of gas and electric power in eastern Montana and western North Dakota and South Dakota.

IMPROVE TALLANT PLANT

Cities Service Gas Company is improving and enlarging its compressor station at Tallant in Osage County, Oklahoma. The plant now operates five of the giant-type 1,000 H. P. compressors. This plant boosts gas from the Burbank and Davenport fields to Caney and Graham and on into Kansas City.

PUEBLO STAFF ADDITIONS

Pueblo Gas & Fuel Company, Pueblo, Colorado, has added a number of men to its staff, looking to the early introduction of natural gas. R. T. Hildenbrand and Kent W. Graham, formerly with the Wyandotte County Gas Company, Kansas City, Kansas, are among the new staff members, the first named being in charge of new business and house heating sales. Seven hundred requests for house-heating estimates are already in hand in Pueblo.

MORGAN WITH OKLAHOMA NATURAL GAS CORP.

J. H. Morgan took the post of manager of the gas distribution properties of the Oklahoma Natural Gas Corporation at Oklahoma City on May 12th, relieving J. R. Ray who has been acting manager at Oklahoma City. Mr. Ray is local manager of the company at Tulsa. Mr. Morgan has been engaged in public relations and publicity work in connection with public utilities and was most recently associated with a gas development project in San Angelo, Texas.

CENTRALWEST FRANCHISED IN MARSHALL, OKLAHOMA

Marshall, Logan County, Oklahoma, has granted a natural gas franchise to the Centralwest Gas Company. The Centralwest Gas Company is planning construction of a pipe line from the Sayre field to several towns in western and northern Oklahoma. Watonga and Weatherford have also granted gas franchises to the same company.

ROGERS FIELD ACTIVITY

Permission to operate in the Rogers field, just north of the international boundary, has been given E. V. Coolidge, E. J. Hubbert, and associates by the Dominion Government. The Rogers gasser, largest well in the British Empire, was measured for the flow of more than 62,000,000 cubic feet per day when it came in three years ago. It has been capped because of lack of market.

PLAN SECOND INTERNATIONAL BITUMINOUS COAL MEET

During the week of November 19, 1928, the Second International Conference on Bituminous Coal will be held at the Carnegie Institute of Technology in Pittsburgh, Pa. According to the Institute, between 60 and 70 scientist and fuel technologists in 11 different countries have accepted invitations to speak at the conference. Some of the subjects to come before this year's conference are low temperature distillation, high temperature distillation, coal tar products, power, smokeless fuel, complete gasification of coal, hydrogenation, pulverized fuel and its new applications, fixation of nitrogen, coal beneficiation, etc.

ORGANIZE TEXAS CITY CO.

The Texas City Gas Company has been organized as the principal subsidiary of the Union Utilities, Inc., of New York which recently acquired the properties of the El Paso Gas Company. The company also owns the gas manufacturing and distributing systems at Galveston, Waco, Paris, and Brenham, Texas. The company will serve a population in excess of 255,000 It owns 12 gas holders with an aggregate storage capacity of 3,407,000 cubic feet of gas and maintains a total of 386 miles of city gas main The gross income of the properties during the last 12 months was $1,837,507.

MOVE NEW YORK OIL CO. GASOLINE PLANT

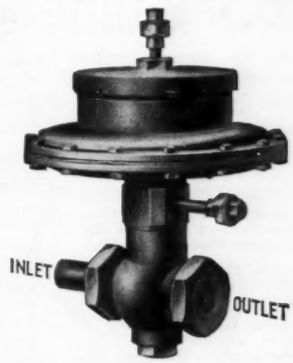
New York Oil Company is moving its gasoline absorption plant at Riverton, Wyo., to Sand Draw on July 1st, following termination of gas contracts with the Teton Gas Products Company. The Riverton plant operates at 100-pound pressure while the Sand Draw plant will operate at 350 pounds. L. T. Krueger will direct the removal operations and will have charge of the plant at Sand Draw.

350,000 STOCKHOLDERS

Cities Service Company added to its list of security holders more than 50,000 new names during the past year, bringing its total number of stockholders to 350,000, and, according to report, placing it second in number of stockholders among all companies in the world. The Cities Service Company has 130 subsidiaries in 33 states.

10 PER CENT DIVIDEND

For the first time in several years the Havre Natural Gas Company, Havre, Mont., late in May declared a 10 per cent cash dividend, the increased earnings of the company following the introduction of natural gas from the Bowes field a year ago.



Fulton Dead Weight Governor

An unusually sensitive, frictionless and long-lasting governor to be used either as a direct governor, or for individual service. Maintains a uniform pressure throughout the entire range of flow.

WRITE for the Chaplin-Fulton 60-page catalog It's free and contains data on our many time-tested and proven gas regulators that you will find invaluable in your work.

The Chaplin-Fulton Mfg. Co.

Organized 1884—Oldest Builders of Gas Regulators in the Country. Built in all Sizes, From 1 Inch to 24 Inches; For All Service. 1 oz. up to 1,600 lbs. Pressure to Square Inch.

28-36 Penn Avenue Pittsburgh, Pa.

REPRESENTATIVES:

WESTCOTT & GREIS, Inc.
Sales and Service
Dallas—Los Angeles—Tulsa

JNO. W. CRAWFORD
Sales Engineer
1855 Industrial St. Los Angeles

Fire Brick Contractors

Established 1906

J. T. Thorpe & Son

Inc.

Specializing in Gas Generator, Boiler, Still and Furnace Brick, Industrial Furnaces, Retorts, Kilns, Brick Smokestacks.

A capable Engineering Department competent to advise on any problem involving firebrick construction.

San Francisco 417 Market St. | Seattle 939 Stewart Bldg. | Portland 609 Ry. Exch. Bldg. | Los Angeles 321 W. 3d St.

A WESTERN GUIDE to INDUSTRIAL PURCHASING

Readers interested in any articles not listed in these pages are cordially invited to advise *Western Gas* of their wants and every effort will be made to furnish a list of the proper manufacturers. Addresses of companies listed on these pages may be found by consulting their advertisements in this issue.

Absorption and Compression Plant Equipment
Baker Iron Works.
Chaplin-Fulton Mfg. Co.
Jensen Instrument Co.
The E. A. Key Company
Western Pipe & Steel Co.

Absorption Towers
Baker Iron Works.
Western Pipe & Steel Co.

Adjustable Plugs
Lattimer-Stevens Co.
Western Pipe & Steel Co.

Agitators
Baker Iron Works.
The Bartlett Hayward Co.
Western Pipe & Steel Co.

Aluminum Bronze Powder for Paint
W. P. Fuller & Co.
Hill, Hubbell & Co.

Analyzers
Fort Worth Laboratories.
Smith-Emery Co.

Annealers (Bar, Blank, Strip)
Pacific Meter Works.

Anti-Fluctuators
Pacific Meter Works.

Apparatus, Experimental Gas
The Bartlett Hayward Co.
Pacific Meter Works.

Appraisals and Valuations
Charles R. Collins.
Smith-Emery Co.

Automobile Tires
Truck Tire Service Co.

Bags, Gas Main
C. B. Babcock Co.
Mueller Co.
Safety Gas Main Stopper Co.

Barometers
Fort Worth Laboratories.
Jensen Instrument Co.
Westcott & Greis, Inc.

Bench Iron Work
The Bartlett Hayward Co.
General Gas Light Co.

Blocks and Tiles, Fire Clay
Gladding, McBean & Co.
Stockton Fire Brick Co.

Blowers and Boosters
Ingersoll-Rand Co.
Connersville Blower Co.
The P. H. & F. M. Roots Co.

Boiler Controls
Gilfillan Machine Works, Inc.

Boiler—Brickwork
J. T. Thorpe & Son, Inc.

Boiler Equipment
E. A. Key Co.

Boiler Maker's Tools
E. A. Key Co.

Boilers, Gas-Fired
C. B. Babcock Co.
Baker Iron Works.

Boiler Settings, Pipe and Boiler Insulation
Pioneer Paper Company.
J. T. Thorpe & Son, Inc.

Boilers, Waste Heat
Baker Iron Works.
The Bartlett Hayward Co.

Boilers, Water Tube
Baker Iron Works.
Western Pipe & Steel Co.

Boxes
Baker Iron Works.

Brass (rods, sheets, tubes, wire)
Mueller Co.

Breakers
Ingersoll-Rand Co.

Breeching (Boiler and Stack)
The Bartlett Hayward Co.
Western Pipe & Steel Co.

Brick, Firebrick
Gladding, McBean & Co.
Stockton Fire Brick Co.

Brick, Firebrick—Installation
J. T. Thorpe & Son, Inc.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Buildings, Steel
Baker Iron Works.
Western Pipe & Steel Co.

Bunkers, Steel and Concrete
The Bartlett Hayward Co.
Western Pipe & Steel Co.

Burners, High Pressure
Lee B. Mettler.
Rotary Manufacturing Co.

Burners, Low Pressure
C. B. Babcock Co.
The Bartlett Hayward Co.
General Gas Light Co.
Johnson Gas Appliance Co.
Lee B. Mettler.
Payne Furnace & Supply Co.
Rotary Manufacturing Co.

Burners—Oil
Rotary Manufacturing Co.

By-product Recovery Apparatus
The Bartlett Hayward Co.

Calorimeter Accessories
Fort Worth Laboratories.
Pacific Meter Works.

Calorimeters
Pacific Meter Works.

Cases, Meter
Pacific Meter Works.
Pittsburgh Equitable Meter Co

Casinghead, Gas Meters
Jensen Instrument Co.
Pacific Meter Works.
Pittsburgh Equitable Meter Co
The Foxboro Co., Inc.

Casing and Tubing (steel)
South Chester Tube Co.

Casing—Iron
South Chester Tube Company

Cast Iron Pipe
McWane Cast Iron Pipe Co.
United States Cast Iron Pipe and Foundry Co.

Castings
The Bartlett Hayward Co.
United States Cast Iron Pipe and Foundry Co.

Cement
Stockton Fire Brick Co.

Cement, High Temperature
Stockton Fire Brick Co.

Cement—Plastic
Pioneer Paper Company.

Centrifugal Pipe
United States Cast Iron Pipe and Foundry Co.

Charging Machines (retort, etc.)
The Bartlett Hayward Co.

Checker Brick
Gladding, McBean & Co.
Stockton Fire Brick Co.

Chemical and Gas Testing Apparatus
Fort Worth Laboratories.
Pacific Meter Works.
Stauffer Chemical Co.
Westcott & Greis, Inc.

Chemists, Analytical
Fort Worth Laboratories.
Smith-Emery Co.

Chimneys, Radial Brick
Gladding, McBean & Co.
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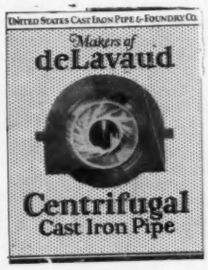

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Superbo Mfg. Co.
Welsbach Company.

Yarn, Calking
Pioneer Paper Company.
Safety Gas Main Stopper Co.

SKIMMING PLANTS GET GAS BY 20-MILE TEXAS LINE

A natural gas line will be constructed from the Hendrick field in West Texas to the Texas & Pacific Railroad in Ward County where gas will be served to a group of skimming plants. Clint W. Murchinson and Roy W. Moyston are constructing the line, which will require 20 miles of five and one-half inch pipe, with four-inch pipe being used as lateral lines running east and west along the railroad to Pyote and Wickett. Messrs. Murchinson and Moyston also operate the Wink, Texas, gas company. They have offices in Dallas.

100 MILES OF NEW LINE TO BE LAID BY LONE STAR

The Lone Star Gas Company has started the laying of gas line extensions aggregating more than 100 miles of 12-inch to 4-inch line, from Little River, Texas. One of the lines will extend in a southeasterly direction from Little River through Rogers and Buckholts to Cameron and then almost due south to Rockdale. The other line will extend south from Little River through Holland, Bartlett and Granger to Taylor. A line exending westward will be laid from a point a few miles below Granger to Georgetown and then south to Hutto and Round Rock.

The Community Natural Gas Company, subsidiary to the Lone Star, will lay the distribution lines within each of these towns. Crews have already begun work on the main lines as well as the city distribution systems.

RESIGNS FROM STANDARD

W. C. McIndoe has resigned as research chemist for the Standard Oil Company of California to accept the position of production chemist for the Celanese Corporation of America, manufacturers of artificial silk.

VANCOUVER, B. C. SALE

In order to increase interest in the sale of gas ranges the gas department of the British Columbia Electric Railway Company, Vancouver, gave away free an oven heat control with all gas ranges sold during May.

AUTO CAMPS OUTFIT FOR SUMMER WITH GAS

In anticipation of a heavy tourist trade, the auto camps in and near Portland, Oregon, are now installing considerable new equipment. One camp has recently installed nine hot plates and another has installed 10 cookers and 10 water heaters.

DOHERTY APPOINTMENTS

Ed. C. Pfenning, manager of the Union Public Service Company, a Doherty interest, at Parsons, Kansas, has been appointed manager of the Joplin Gas Company, another Doherty unit. He replaces George Matthews, who has resigned to accept a position with the Pittsburgh Water Heater Company. The appointment became effective May 1st. H. H. Harrington, superintendent of the Arkansas City plant, was appointed to succeed Mr. Pfenning as manager of the company at Parsons. The position left vacant at Arkansas City has been filled by the appointment of E. S. Larson. Mr. Larson was formerly Superintendent of the Union Public Service Company, Parsons.

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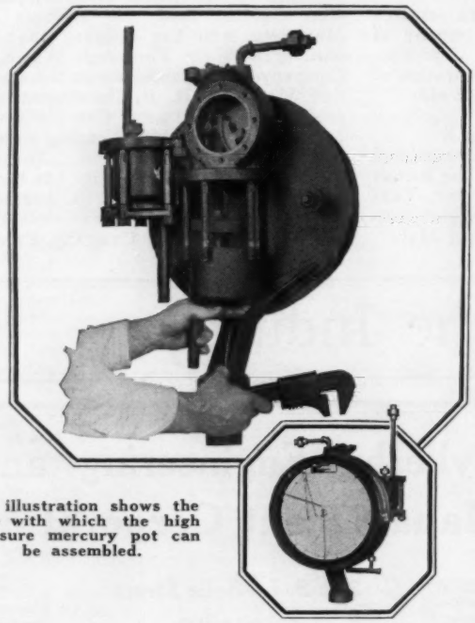

The illustration shows the ease with which the high pressure mercury pot can be assembled.

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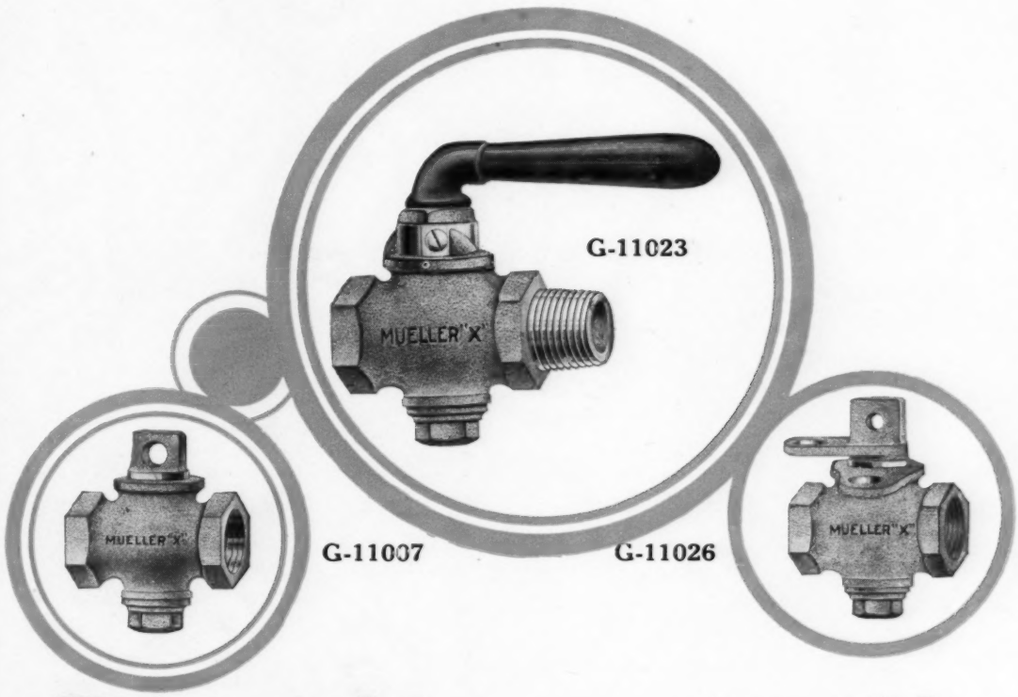

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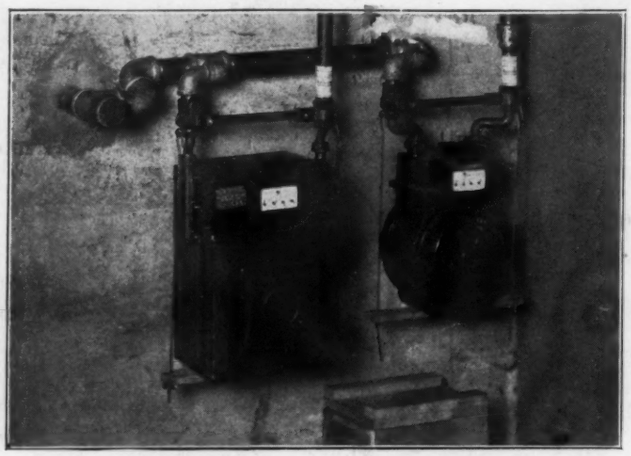

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